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Notes and Comments

Professor Haber

DURING several years past, Professor Haber has been in a precarious state of health, particularly of late while he has been resident at Cambridge. He left England only a few days ago. His death at Basle, last week, on his way south, is no surprise. Apart from physical disabilities, he has undoubtedly long been subject to great mental strain. In May last, he resigned from his position as director of the great research establishment, the Kaiser Wilhelm Institute for Physical Chemistry, in Berlin, mainly as a protest against the harsh treatment Jews in academic positions were receiving in Germany. He has been a chief actor in the great drama of German industrial progress during the present century, notably in its development on the engineering side, in the realm of high pressure. The service he was able to render to his country, very early in the war, was chiefly an outcome of his command of chemistry on the mineral, mathematical-physical side, though his personal enthusiasm probably played the greater part.

Eventually, the Haber-Bosch process of making ammonia from atmospheric nitrogen was a great engineering achievement, the work of an accomplished team, led with consummate skill and teutonic perseverance. There is little doubt, however, that during the early stages of development Haber played a determining part. At one time our great enemy, of late years we have reckoned him an anglo-phil man of most unusual breadth and liberality of outlook, a close observer of affairs. Under happier conditions, had he been allowed, he might well have played a leading part in smoothing out difficulties and reconciling diversities which now hold nations apart. In losing him, we lose a great man whom we can ill spare.

The Future of Trade

A FEW weeks ago we quoted from contemporaries a number of optimistic opinions upon the future of trade. Those opinions represent our own, but with this reservation, that they will not be justified by events unless we mould events ourselves. Increased confidence is a great asset in the promotion of trade, but by itself it is not enough. Many a business has been founded with confidence, but has foundered through lack of good management. It is necessary that the nation's business should be managed well. Some of the essentials of good management were recently discussed by Sir Arthur Balfour, who recalled that all over the country and in every industry manufacturers have improved their methods and processes, erected new plant, applied scientific and industrial research to their industries, and have scrapped what is out-worn both in machinery and personnel. Some of these things have not yet been taken to the limit. There are many instances of the continued use of out-worn plant, but it is because many manufacturers are renewing their equipment that the present improvement in trade has so largely been felt by the iron and steel industry. Whilst we are still rather less in agreement with Sir Arthur concerning the universality of the steps that have been taken, we agree whole-heartedly with his remark that: " Perhaps the chief need is that owners of industrial concerns should go abroad themselves to find out exactly what the world wants to buy and see that their factories deliver the right article at the right price."

It is not, however, of the individual manufacturer that we would write to-day. There is much he can do, but there are things he cannot do. The sentence we have just quoted from Sir Arthur Balfour is symptomatic of the need of Britain. As the chairman of the Westminster Bank has remarked, " Although there has recently been some improvement in our exports, the betterment of the economic position of the whole community has been due mainly to the increase of the internal demand. It represents largely the resumption of repair, renewal or replacement of equipment in every branch of the nation's life. The time comes when everything can wait no longer for replacement or renewal. Such a time occurred last year, and explains the internal improvement recorded in many leading countries unaccompanied by any corresponding degree of increase in international commerce."

Remove Trade Restrictions

WEALTH arises from the up-grading of materials, whether those " materials " consist of labour which would otherwise be idle, the fashioning of articles by the craftsman, or the working of animal, vegetable or mineral products. Apart from coal, Britain is not well supplied with raw materials, and must therefore live by the art of the craftsman. Only those nations that have abundant supplies of these raw materials can live by taking in each other's washing. It is from the realisation of the importance of the primary producer that we have always preached the development of the Empire and of trade within the Empire. The chair-

man of the Westminster Bank supports us and goes farther in a direction we urged after the Economic Conference. He remarks that we cannot hope so to increase trade as to absorb our two million unemployed unless and until there is a far larger volume of trade between nations, but that, on the contrary, policies of narrow economic nationalism are still in the ascendant. If the nations will not remove trade barriers what is Britain to do?

We commend this thought to the leaders of the chemical industry. A removal of trade restriction in so influential a group, between the members of which there is every incentive to promote trade, must give a far sounder basis for optimism than the present hopefulness and moderate trade revival. A revival based upon internal needs will languish when once those needs have been supplied. When *confidence* is on all men's lips and hopefulness in their hearts is the time to consolidate what has been gained and to assist development in the future by statesmanlike action. Perhaps the Government, great as has been the value of its policy, has never been faced with a time of greater opportunity nor of greater responsibility. If the present revival dies away, the resulting despondency will be intense. The future holds formidable problems to be solved and difficulties to be surmounted; we shall not gain if we allow confidence to be unreasoning and refuse to face the tasks that lie before us. If the Government should prove blind to the needs of the future, it is the banks and, above all, the trade associations in every industry that must in their own interests see that representations are made and must do all in their power to ensure that the necessary action is taken.

Naming the New Hydrogen

NOT only is the dollar world disturbed, being without sense of standard, seeing how fast it is heading for the devil; the fen-worshipped, Knock More monster, heavy hydrogen, is also before the Courts, on the question of name. Cambridge, in its love of stones, possibly because they tell of the age of the earth, is apparently thinking back to the great Saurians of Liassic times and would have us call it *Diplogen*. The name is clearly one asking for degradation in use to *Double Gin*, if not *Double-Chin*, finally to *Dumpling*—the reverse of the Shavian flight from *Cundit* to *Condewit*. We can imagine a model of the monster, erect upon its hindquarters, in a skittle alley, in the Great Hall of the Natural History Museum, South Kensington, with the label " See, what a big boy am I; think how hard I can hit and make the atoms see stars." Alternatively, we see a model like that of the fish with its small male attached by an outrigger to its side. We are assuming, of course, that so great a discovery is necessarily already an exhibit at South Kensington, if not a toy at the best known of West End stores.

Three Wise Men, this time from the West, are come from Columbia, New York and the Bureau of Standards, Washington, with parental thoughtfulness, to tell us in " Nature " (February 3) of the linguistic horrors they were inclined to perpetrate before proposing the unfortunate names *Protinium* and *Deuterium* for the two hydrogens. That Columbus discovered America, let alone the American monsterium, will have to be deplored, if two such names be ever entered upon the list of elements. In the last paragraph of their letter, the pilgrims in fact pathetically admit their own delinquency:

" Whatever names are finally selected, we do believe that both isotopes of hydrogen should be named and the name hydrogen be used to apply to both of them."

So do we believe. Why, then, believing this, do they make such strange suggestions? Whatever may happen, whatever gift of murder or transmutation the new heavyweight may develop, hydrogen must remain hydrogen, to the glory of Lavoisier and Cavendish. We should be proved madmen, beyond all reach of Bancroftian Rhodonate, if we were to change the name. The Court must rule that all the appellants amend their case before it can be tried at law.

Gas Cylinder Explosions

DURING the past few days we have read of yet another fatality due to the explosion of a cylinder of compressed gas. These fatalities occur periodically, though perhaps not very frequently in view of the number of such cylinders which are in use. For each explosion that is attended by fatal results there must be many of a less serious character. We suggest that those engaged in the supply of compressed gases should consider whether recent work on the subject could not lead to the use of cylinders that would be proof against *all* accidents, whilst admitting of the use of yet higher pressures. By the Home Office regulations the permissible pressure is fixed, we believe, at 1,800 lb. per sq. in.; and no further advance on these figures is possible until the inspectors have been satisfied that it can be made with safety. It is not, however, so much the higher pressure as the safer cylinder that is our present concern. We recognise that 40 years ago the working pressure was not greatly in excess of 150 lb. per sq. in. and that great advances in safety and utility have been made since that date. The work of the Gas Cylinder Research Committee has contributed in no small measure to that result.

The movement that is on foot for the employment of compressed town's gas as a fuel for motor vehicles has lead to intensive private investigation into the safest method of storing the gas for traction purposes under a pressure of 3,000 lb. per sq. in., the higher pressure being desirable for economic reasons. Several vehicles are now in daily use and the cylinders have given no trouble even at these increased pressures. We commend to the attention of the compressed gas section of the chemical industry the paper by Mr. Marsh read before the iron and steel industry during last year. The new cylinders are made of an alloy specially developed for the purpose. The cylinder walls can be made much thinner than with the usual metal but the essential advantage is that when tested severely whether by firing at them with bullets, by dropping from a height, or by impact, they are exceedingly difficult to damage. Even more important is their behaviour when tested to destruction by high internal pressure. No cylinder has yet been made to shatter dangerously, the cylinder bulging and ultimately splitting along the length. The general employment of cylinders that burst without fragmentation would virtually prevent fatalities in the handling of compressed gases.

Death of Professor Fritz Haber

Pioneer in the Synthesis of Ammonia

WORLD-WIDE chemistry has sustained a notable loss by the death of Professor Fritz Haber, the distinguished German scientist who discovered the process of producing synthetic ammonia from the nitrogen of the air, which occurred in Basle last week at the age of 65. He was born in Breslau in 1868 and was the son of Siegfried Haber, a chemical merchant and alderman of that town. His early training aroused in him a deep interest in philosophy and literature as well as science, but it was to chemistry that he decisively turned in his eighteenth year in the choice of a career. He studied chemistry first in Berlin and afterwards under Bunsen in Heidelberg, under Liebermann at Charlottenburg and under Lunge at Zurich. After a brief interlude of commercial work and of study with Ludwig Knorr, he settled down as an assistant at the Technical High School at Karlsruhe in 1894 and two years later he became professor of industrial chemistry there.

His first appointment as Bunte's assistant left him a great deal of freedom, which he utilised in working out privately his early studies in electro-chemistry. He taught gas chemistry, as well as the chemistry of dyes and textiles, and at the Technische Hochschule he lectured of his own choice to a few special students who shared his enthusiasm for electro-chemistry. His researches throughout his Karlsruhe period covered the theory of the pyrogenic reaction of aliphatic compounds, the combustion of illuminating gas, the water gas equilibrium in the Bunsen flame, the decomposition of gases in a very hot flame and the constitution of the inner cone of the Bunsen flame. To organic chemistry he contributed an explanation of the reduction of nitro-compounds; to inorganic chemistry he contributed knowledge on the preparation of a pure carbon from carbonates during electrolysis, and to textile chemistry a new process of colour printing.

Professor FRITZ HABER.

It was in the latter half of his period at Karlsruhe that Professor Haber interested himself in the reactions of nitrogen and, in collaboration with Le Rossignol, after many disappointments, succeeded in 1908 in constructing an apparatus, which by the use of high temperature and pressure, and the selection of osmium and uranium as catalysts, achieved the first direct synthesis of ammonia. At the advice of Engler, the Badische Anilin Soda Fabrik became interested in the process and sent its representatives to look over the apparatus which was turning out 100 cc. liquid ammonia per hour.

The history of failures among the investigators who had been working at the problem for years had produced an attitude of scepticism toward it, and when the company's representatives arrived, the little model refused to work. Mittasch, however, remained in patience and when the apparatus was restored to operation, he must have visualised beyond it the great system of nitrogen fixation plants of which it was the beginning. The company took over the process, it passed from the laboratory to the factory, and the two huge plants which arose speedily at Oppau and Merseburg became the nucleus of an industry that formed immediately a great factor in the commercial and economic life of Germany.

During the world war Professor Haber served on Germany's war-ministry as a member of the group of scientists who endeavoured to conserve and use to best advantage the raw materials with which the country was so ill supplied. His knowledge of gas chemistry gave the German army the method of projection which was used in the first gas attack at Ypres and he it was who organised and directed thereafter the development of knowledge in gas warfare and the instruction of the military organisation in its use.

His war service over, Haber returned to face discouragement and difficulty in the way of readjustment to his normal scientific pursuits. He had established in 1911 the Kaiser-Wilhelm Institute for Physical and Electro-chemistry at Dahlem, in which, from its beginning, important researches were carried on under a system which permitted every possible freedom to the individual worker, while the investigations developed in co-ordination under a director beyond whose vision or experience it would have been difficult for his subordinates to expand.

The financial resources of the Kaiser-Wilhelm Institute, however, were withdrawn during the war. The 1918 Nobel award to Haber partly smoothed his way, and gradually but surely he drew together again a staff of physicists and physical and colloid chemists of distinction.

Willstätter, a friend of Haber, has outlined the qualities of the man in a few telling strokes: "Breadth of vision, depth of thought and perception, love of new and often unconquerable kingdoms of thought, wealth of ideas and of verbal expression, warmth of feeling." "His greatness," he says, "lay in the conception of ideas of a scientific nature. The stimulation, the plan, the method were to him more important than the result. Creative work pleased him more than the completed task." As an illustration of this, we may cite the story, told by Willstätter, of Haber's experiments to determine the gold content in sea-water and to work out a method of extraction. Search of the north and south Atlantic and of the Polar seas revealed at best a pitifully small proportion of the metal, but when Haber was asked about his attitude as to the results, he replied, "If there was no gold, there will at least be a fine book." Haber began as a youth to seek "for the causes of things"; with friends and associates, in art and in science, in the history of the past and of the present, in national and international concerns, his search continued, and made his life an intellectual adventure whose zest never failed.

Since the war Professor Haber has been an ardent worker in the cause of peace and international relationships. For the last few months he was resident in Cambridge, where, with one or two assistants, he was continuing his researches. It had been his practice for a number of years to go to the South of France for his health during the winter, and he was on his way south when death overtook him.

Professor Haber resigned from the Kaiser Wilhelm Institute last May. Among other practical uses to which he put his great scientific knowledge was the invention of a safety lamp for miners that gives audible warning, by means of a whistle, of the presence of poisonous gases.

South African Whale Oil

THERE has been a steady decline in the value of the whale oil taken from South African seas, although previously whale products represented the Union's principal exports derived from the sea. In 1928 whale oil was worth £25 a ton. In 1933 the value was £9 per ton. In 1934 the value of whale manures fell from £88,955 to £27,044, and this decline has continued. The Durban factory is the only coastal depot at present operating. While Antarctic whaling remains so prolific and the prices of whale products remain at the existing low level there is no prospect of a recovery.

The Early Training of the Chemist

A Discussion by School and University Teachers at Bangor

A LESS specialised early training for the chemist was advocated at a discussion between school and university teachers held at the University College of North Wales, Bangor, on February 2. The occasion was a joint meeting of the Chemical Society and the University College of North Wales Chemical Society, with Professor J. L. Simonsen, F.R.S., in the chair.

In opening the discussion Professor CAMPBELL JAMES, of the University College, Aberystwyth, submitted that the purpose of the meeting was to consider the gradual development of a pupil through a school course and the university to the attainment of a degree with honours in general chemistry as a preliminary to the later specialised training which would entitle him to be described as a chemist. Attention was called to the recent report of the Association of University Teachers on "Entrance Tests and Initial Degrees" (" The Universities Review," Vol. 3, No. 1, October, 1930) and the opinion expressed that a training in physics and mathematics in addition to chemistry was imperative but not sufficient to provide an adequate cultural background to life. A broader basis of instruction at the higher certificate stage is necessary, not only from the cultural standpoint but also to provide that groundwork of positive knowledge which is essential for the full understanding of the many specialised side-branches of modern chemistry. The importance of the study of biology as a definite addition to the curriculum was emphasised and a more serious study of modern languages advocated.

Defects in School Teaching

The main defects of the school teaching of chemistry are specialisation at too early a stage and a tendency to sacrifice thoroughness in groundwork in favour of a superficial study of modern developments. The present methods of awarding university and State scholarships are in great part responsible for these faults, the welfare of the many being sacrificed to the precocity of the few. The speaker advocated a post-school certificate course of study on a considerably wider basis than at present with chemistry, physics, mathematics, biology and modern languages as integral parts, essential to the admission to a university honours course in chemistry.

Mr. S. J. EVANS, M.A., headmaster of the County School, Llangefni, outlined the following scheme for the education of the future chemist. Taking five years as the normal period of preparation for the school certificate, curricula of arts and science pupils should bifurcate at the end of the second or third year. The future chemist must be given careful training up to the present matriculation stage in English language and literature and give serious attention to German and French, geography, history, mathematics, science, including chemistry, physics and biology, handwork in wood, metal and glass and drawing—an essential if formidable list. He would not attempt to bring all his subjects up to the present school certificate standard and certain of them may be dropped in his fifth year. Then would follow two years' study for the higher school certificate in four subjects, chemistry, biology, physics and mathematics, with translation from French and German, an English essay and handwork as essential but subsidiary subjects. Both at school and at the university the student's imagination must be cultivated by his reading first class works of fiction. Mr. Evans stressed the desirability of a closer contact of the student during his university courses with chemical works.

Conception of Fundamental Theories

Dr. A. E. BRADFIELD pointed out that the continual growth of chemistry necessitates frequent reconsideration of the division, between the school and the university, of the subject matter to be taught. There is a tendency to relegate to the school additional sections of the subject, with a view either to their less thorough treatment in or to their entire omission from the university syllabuses. While it is desirable that the school teaching should incorporate something of the results of recent work, wherever relevant and necessary to give the pupil an outlook in accord with modern chemistry, on neither side is it desired that the schools should be burdened with that which is more fittingly taught at the university stage. On the other hand, it becomes increasingly important that the future chemist should reach the university with a clear conception of the fundamental theories, and it is, therefore, suggested that the schools return to the teaching of the history, and by it, the philosophic method of chemistry.

By tracing the history of a concept or idea, it should be shown that science is not merely a system of knowledge, but also a method of acquiring knowledge, and attention should always be directed to the logical steps by which a theory or an hypothesis has been arrived at and tested. This course would tend to correct the faulty perspective met with later in university students, of which examples are easily given. A further advantage is that such teaching is equally of value from its cultural aspect to the pupils who have no intention of becoming chemists.

Humanising the Teaching of Science

Dr. J. R. MORGAN, headmaster of Penygroes County School, condemned the matriculation subject of general science, as it was impossible to devise any coherent system of practical work for this subject, which tended in consequence to become superficial. He supported the idea that science teaching needs to be humanised and would welcome the study of the work of great scientists as part of the curriculum. Closer contact of the higher school certificate pupil with English literature and history would be of great benefit, and would assist at a later stage in the writing of concise reports of his own work.

Mr. H. R. LOW, M.A., B.Sc., lecturer in education at Bangor, expressed the opinion that the over-specialisation, so prevalent in schools, was even more marked in the science courses of the university. He found that some graduates who had pursued an honours course in chemistry had a very narrow range of interests, due to lack of contacts with other fields of activity. He considered that although the specialised course was of value as a preparation for industry or for research, it had great disadvantages for the future teacher of science.

Professor J. E. COATES, University College of Swansea, in summing up, said that the discussion had brought out a very general conviction on the part of both school and university teachers that the training given between the school certificate and university entrance should be less specialised and on a broader basis than is usually the case at present. The machinery of transition from school to university, including the award of scholarships, needs drastic modification. The institution of a new university matriculation examination is badly needed and will have to come soon, in spite of the magnitude and practical difficulty of the change.

Scientific Method

Speaking of the teaching of science in schools, he (Professor Coates) emphasised the importance of firmly implanting a knowledge of and belief in scientific method. The earlier this could be done the better. Pupils coming to the universities frequently could not observe accurately and had little real appreciation of scientific method. They lacked curiosity and did not ask questions. While agreeing that the fundamentals of chemistry must be thoroughly ingrained into pupils at school and too rapid specialisation avoided, nevertheless one must not unduly repress the natural desire of young people to forge ahead. In the hands of a good teacher this desire can be satisfied and their appetites kept keen without scamping the fundamentals.

The CHAIRMAN, in conclusion, expressed his pleasure that so many of those interested in chemistry in North Wales were present. He considered that the discussion had been very profitable and he thanked the speakers for their contributions and Dr. F. G. Soper for his work in organising the discussion.

Gas Washing in Theory and Practice

A Study of Factors which Influence Plant Design

TWO papers on gas washing were presented at a meeting of the Institution of Chemical Engineers held in London on January 31. The first paper by Mr. H. Hollings, M.Sc., A.I.C., and Mr. L. Silver, B.Sc., A.R.C.S., A.I.C., dealt with the general question of the washing of gas, whilst the second paper by Mr. L. Silver gave particular attention to the subject of multi-stage washers. The authors described a long series of laboratory experiments carried out at the Fulham laboratories of the Gas Light and Coke Co., and dealt in great detail with the theoretical aspect of their subject.

Liquid Distribution in Tower Scrubbers

At the conclusion of their mathematical consideration of the subject the authors pointed out that an important practical difficulty in applying the formulæ discussed for obtaining maximum efficiency is that of estimating the area of interface at which absorption is taking place; for, although the whole of the surfaces of the packing may be presented to the gas stream, only a part of it is covered with a continuously flowing layer of liquid. The proportion of the surface that is so covered, and not merely wetted, depends on the rate at which liquor is fed to the washer; for it is very difficult, particularly with small rates of flow, to ensure an even distribution of the liquid over the whole upper surface of the packing, and it is impossible to constrain this liquid to spread itself in a perfectly even layer over the whole of the packing in the tower. The ratio of the actual active wetted surface to the maximum surface that can be actively wetted by indefinitely increasing the liquor rate may be represented by a distribution factor, which has been determined by Kowalke, Hougen and Watson (" Chem. and Met. Eng.," 1925, 32, 506). They have shown that the distribution factor decreases rapidly as the rate of liquor flow falls off. In a short tower (4 ft. high) packed with boards on edge they found that the rate of water flow required to give a distribution factor of 90 per cent. was 36 gal. per sq. ft. of cross-section per hour.

Capacity of Towers

Whether such a high distribution factor would be obtained with a full-size tower is doubtful, for it has often been stated that in packed towers used as washer-coolers the rates of absorption and of heat transfer begin to fall off when the liquor rate falls below 120 gal. per sq. ft. per hour. Such high liquor rates are quite impracticable in counter-current ammonia towers under gasworks conditions where the volume of the liquor has to be kept down to a minimum. Thus for the washing of 3,000,000 cu. ft. of gas per day, using 5 gal. of water per 10,000 cu. ft. of gas, a tower only 1 ft. 6 in. in diameter would be required if the rate of 36 gal. per hour were to be maintained. Such a tower would be impracticable on account of the great height necessary and the pressure head required to force the gas through it. Towers of much greater cross-section are in general use, the dimensions of which are more nearly in accord with a rule due to T. Glover, who recommended a flow equivalent to 8.7 gal. per hour per sq. ft. of cross-section for a board-filled tower, the basis of the rule being that he found by observation that the liquor dripped evenly from the lower edges of the boards in a tower fed with water at this rate. It does not necessarily follow, however, that the whole or any large part of the wetted surfaces is in an active condition, *i.e.,* covered with a flowing and constantly changing film of liquid. The value of the distribution factor for these conditions is probably very low indeed, judging from the actual performance of such towers. It may be supposed, for example, that the liquor flows down in the tower in narrow streams rather than as a uniform film.

This difficulty of obtaining satisfactory distribution limits the effective use of tower-scrubbers as counter-current washers to those operations in which a large quantity of liquid is used in relation to the volume of gas washed; that is, to the removal of gases of low solubility or to operations where the volume of liquid is unimportant, so that a large excess may be employed without disadvantage. The practice of recirculating the liquor over and over the tower may improve distribution but only at the expense of a total sacrifice of the counter-current principle. The multi-stage washer is a very effective compromise between these two methods of working. Further research on the design of counter-current washing plant, leading to the improvement of liquor distribution at low rates of flow, should be of great value in that a considerable reduction in size and cost of plant should result, accompanied by an increase in washing efficiency.

Multi-Stage Washers

Speaking particularly of multi-stage washers, Mr. Silver pointed out that the term multi-stage washer was used for convenience to signify any washer or scrubber in which the gas is treated with liquid in a number of successive stages or effects, in each of which the liquid is circulated or mixed. At the same time liquid overflows from stage to stage at the rate at which it is fed to the first stage. It is usual, but not essential, for the liquid to cascade from stage to stage counter-current to the gas. The washing, however, is not true counter-current, for at each stage the gas is washed with a liquid of more or less definite strength; so that, while the concentration of the constituent in the gas may decrease continuously from end to end of the washer, the concentration in liquid increases from stage to stage in a series of steps. A succession of tower scrubbers, the liquid in each of which is circulated many times before passing to the next, may also be regarded as a single multi-stage washer, and this method of working tower scrubbers is adopted primarily to overcome the difficulty of obtaining adequate distribution in a true counter-current tower.

Multi-stage washers, he continued, may be classified according to the means adopted for obtaining contact between gas and liquid, which may be (a) bubbling the gas through the liquid; (b) spraying the liquid across the gas path; or (c) passing the gas over surfaces wetted with the liquid.

Bubbling is especially favourable to the absorption of those gases for which the liquid film resistance is of chief importance; that is, of gases which are only slightly soluble in the liquid medium. A rising gas bubble is continually meeting fresh liquid, so that the liquid film is being rapidly disturbed and changed, and diffusion of the solute across it is promoted. The bubbling method does not favour the absorption of very soluble gases for which the rate of absorption is controlled mainly by the gas film resistance. Another disadvantage of the bubbling method in practice is that it is necessary to provide a definite head of liquid at each stage through which the gas must be forced; consequently either the washer as a whole must throw a high back pressure, or else the number of stages, and hence the effectiveness of the washer, must be very limited.

The Spraying Method

Spraying the liquid through the gas gives high absorption rates for very soluble gases, since the droplets of liquid, moving with high velocity, are continually meeting fresh gas surfaces, so that the gas film thickness should be very low. It is usually adopted in centrifugal washers, in which the liquid is thrown across the gas space from a rotor revolving at high speed about a vertical axis. The gas passes upwards through the annular space and meets the spray in the successive stages. In order to provide sufficient surface of contact between gas and liquid the spray must be very finely divided, and if this is so there is a considerable tendency for the finest droplets to be carried forward with the gas. Thus, though absorption of the constituent by the liquid may be complete, separation from the moving gas is not, and some of the constituent is carried forward into the next stage just as if it had not been absorbed. This phenomenon of " priming " is inseparable from the type, for it is found impossible in practice to obtain a spray composed of drops so uniform and of such a size that, while small enough to present an adequate surface to the gas, they are all large enough not to be carried forward with the gas by virtue of its velocity.

By the use of wetted surfaces for obtaining contact, very high gas velocities can be employed without high back-pressures and with very little risk of entrainment of liquid. Such high velocities decrease the thickness of the gas film and consequently its resistance to diffusion. If the liquid is flowing rapidly over the surfaces, it is also much agitated and the effective liquid film is very thin. By the choice of suitable packing materials a large area of washing surface can be obtained in a comparatively small volume. For these reasons, among others, washers employing wetted surfaces are most favoured in the modern gasworks.

Good Circulation Essential

In the case of wetted surface washers it is essential to secure good circulation in order to ensure (a) that the liquid is flowing actively and rapidly over the whole of the wetted surfaces, and (b) that this liquid shall not differ materially in composition from the bulk of liquid in the bay. This is accomplished in rotary washers by attaching the packing material to a rotating horizontal shaft, so that the surfaces dip periodically into tanks of liquid, and in static washers by returning the liquid continuously to the upper part so that it flows down over the surfaces again. The direction of circulation within the bay may be either concurrent with the gas flow, counter-current to the gas flow, or across the gas flow. This direction is of little importance when the rate of circulation is very high, because then the whole of the liquor in the bay is of practically the same concentration. When the rate of circulation is so low that the liquor returning from contact with the gas to the reservoir, whence it is recirculated, is of appreciably higher concentration than the liquor therein, the direction of flow will influence this concentration and thus affect the performance of the washer.

In connection with this investigation a large amount of experimental work has been carried out on various rotary washers employed for the removal of ammonia from crude coal gas by washing with water or weak ammoniacal liquor. The washers examined were of several different types by various makers, and were working under a great variety of conditions as to the nature, cleanliness and ammonia content of the gas and the washing liquor, the temperature, the load on the washer and its mechanical state.

In a rotary washer unprovided with any means of circulation other than the wetting of the rotating surfaces, it is obvious that the rate of circulation depends directly on the speed of rotation. The rate of circulation increases more rapidly than the rotor speed, for the higher the speed the thicker is the film of liquid taken up. Hence on theoretical grounds the stage efficiency should be improved by increasing the rate of rotation.

Naphthalene Extraction

The liquor circulation may be maintained by means of the liquor picked up by the rotating surfaces alone, or this may be increased by the action of tipping buckets attached to the periphery of the rotor, or circulating pumps may be used as in the static type of washer. When the constituent is very soluble the first of these methods may be adequate, but the experimental work has shown that, even for ammonia in the presence of carbon dioxide, the circulation at the maximum rotor speed may be insufficient when the surfaces are wooden boards if the solubility is decreased by high temperature in the washer. For the extraction of naphthalene, the solubility of which in gas oil is about forty times that of ammonia in liquor, the rotating surfaces should provide ample circulation under all circumstances. In the case of the absorption of benzol by gas oil, however, the solubility is so low that, unless additional circulation is provided by pumps or buckets, the volume so passing will be quite inadequate.

From the discussion in these two papers it follows that when the choice of plant for a given operation lies between tower scrubbers and multi-stage washers, the principal technical criterion should in general be the solubility of the constituent. For when solubility is low the difficulty of maintaining a sufficiently high rate of circulation renders the multi-stage washer unsuitable, whilst the high flow ratio that is necessarily employed makes it possible to maintain even distribution over the packing of a tower scrubber. For gases of high solubility the volume of liquid used is insufficient for proper wetting of the packing in a tower scrubber, and the distribution factor becomes so low that a tower of excessive size would be required. It has been shown, however, that a multi-stage washer overcomes this difficulty and works most efficiently under these conditions. The extraction of benzol from coal gas, for which about 60 to 90 gal. of gas oil are employed per 10,000 cu. ft. of gas, is an example of the type of absorption that can best be carried out in a tower scrubber. On the other hand, the removal of naphthalene by the same solvent only requires the use of about 25 gal. of oil per million cu. ft. of gas, which is hopelessly insufficient to wet the surfaces in a tower scrubber of large enough diameter to pass the volume of gas, and a multi-stage washer is to be preferred.

If, however, in any washing operation it is necessary to maintain a very low slip the limitations of the multi-stage principle become important, particularly if the proportion of liquid used is to be kept down near to the theoretical minimum, and a large number of stages must be employed if the desired result is to be obtained. If washing is to be very complete a tower scrubber should be used when possible, or if the flow ratio is very low a number of multi-stage washers in series is desirable, with the liquid passing through the series counter-current to the gas.

Points from the Discussion

Mr. H. GRIFFITHS asked whether it is really possible to design a counter-current tower scrubber to do a specific duty without getting into unreasonable proportions. He did not know what the experience had been in the gas industry but in the chemical industry it was usually necessary to convert a tower scrubber into a multi-stage scrubber, to split it up into sections and re-circulate the liquid through the tower to avoid unwieldy proportions. Was it not the fact, therefore, that it is almost impossible to design a really satisfactory counter-current scrubber?

Dr. LESSING said a point on the practical side was that the experimental work on which the formulæ mentioned had been based made use of pure solutes and pure gases, but in practice these particular conditions did not usually apply. Many of the curves shown by Mr. Silver indicated that traces of CO_2 in the gas facilitates absorption and that brought him to the point which must not be overlooked, viz., that chemical reaction has to be taken into account in these things and wherever a reaction which would chemically combine and absorb a gas can be applied, it was all to the good. It had been shown, for instance, that where SO_2 was absorbed in a caustic soda solution, absorption was facilitated as compared with the case when it was absorbed by a dilute sulphuric acid solution.

Cyanogen Extraction Problems

Several years ago when he had the privilege of being associated with the Gas Light and Coke Co. work was done upon cyanogen extraction and he had been faced with exactly the same problems with multi-stage washers—rotary washers—and in connection with that it had been possible to evolve a scheme which he commended to the authors in developing the practical forms which had become necessary on account of the ammonium sulphate economic conditions. In that particular case the ferrous sulphate which had to be used in order to obtain the ferrous hydroxide or carbonate for cyanogen extraction was put behind the ammonia scrubbers, so to speak as a catch box, and in that way it was possible to obtain ammonia liquors of the highest possible concentration without any appreciable slip, the slip being taken up by the chemical reaction in the ferrous sulphate. During the past few years he and his colleagues had been engaged on the question of SO_2 extraction from flue gases and in that connection he had found exactly the same result. In that case it was entirely a question of the rate of water flow over the scrubber surface apart from it being a question of contact rather than spray in order to get a good result. The gas contained only 0.066 per cent. of SO_2 and this had to be scrubbed out to the extent of at least 95 per cent. with a slip of not more than 5 per cent. In practice it could be done with 2 per cent. with quantities of gas passing through the scrubber which in any one unit amounted per minute to the hourly throughput of the rather large scrubbers in gasworks.

Dr. A. J. V. UNDERWOOD thanked the authors for having shown that, contrary to what many people believed, a little mathematics can occasionally be useful even in practical problems. Referring to the second paper, he said the methods given for calculating the multi-stage washers were extremely useful. There was an obvious analogy between absorption and distillation in connection with the gaseous and liquid phases. In fact, the case of absorption was rather simpler because the movement of the substance absorbed was from the gas into liquid, whereas in distillation there was generally a movement both ways. There was the more volatile component being transferred from the liquid to the gas and the less volatile component from the vapour to the liquid. In the case of absorption there was a system of one-way traffic but in the case of distillation there was a more complicated traffic which required more regulation.

Mr. CHARLES COOPER said he was pleased to note Mr. Silver's appreciation of the importance of the internal circulation rate in a multi-stage washing operation. At the same time, it should be pointed out that the actual existence of a satisfactory rate per stage is bound up with the number of stages. For example, there might be a 12-stage machine with apparently an inadequate circulation per stage. By taking out half the diaphragms and joining two stages into one, it was possible to procure a six-stage operation each with an adequate circulation rate, yet the performance of the machine would actually be impaired.

Professor J. R. PARTINGTON said in the case of ammonia, or SO_2 or hydrochloric acid, the gas going into the liquid was the same as the gas coming out and therefore it could be said there was a partition of the gas between the gas phase and the liquid phase, but if we considered the case of nitrogen peroxide, for instance, the gas going into the liquid was NO_2 but the gas coming out was NO and therefore there was no possibility of having a partition factor. It was rather difficult to know what to do in cases like that. His only point in mentioning it was to suggest that the authors might consider this a possible further important problem.

The Immortal Memory of Sir E. Frankland

Professor H. E. Armstrong's Oration at Lancaster

PROFESSOR H. E. ARMSTRONG, founder-president of the Lancaster Frankland Society, which was established last year, and a former pupil of the late Professor Sir E. Frankland, delivered the Frankland Oration at a meeting of the Society at Lancaster on January 18. One of the functions of the Society is the delivery every three years of a Frankland Oration by its president, dealing in general with the relation of the chemist and chemistry to public welfare, and Professor Armstrong's discourse was the first of the series.

Having reviewed the life of Frankland and his great service to chemistry and to the public generally, Professor Armstrong expressed his own belief that our schools are rotten from the top to the bottom of the system, except perhaps those of a purely technical character. We must find, he said, a new race of leaders, able to meet the needs of the times, by giving disciplinary training. All but 90 years have passed since Frankland left Lancaster for the Metropolis—to lay world foundations, both in pure and in applied chemistry. The value of the social service he rendered in connection with water supply cannot be overrated.

A Colossal Edifice of Knowledge

Meanwhile, a colossal edifice of knowledge has been upraised by those who have followed the examples and developed the methods introduced by the pioneers. To-day we have an astounding knowledge of world materials and even of vital processes; we are well on the way to understand our own mechanism sufficiently to see that we may hope to become conscious directors of our bodily warfare. The operations of the chemist can now be conducted with unsurpassable certainty; our science is an embodiment of scientific method in its highest form. The known facts are innumerable but they are amenable to simple classification; the few rules laid down by Frankland almost suffice for the purpose. The element carbon stands out as the central luminary in the great mystery of life. We are chemical mechanisms built of composite fluent plasticity in character of living things. The vision before those of us who are privileged to have some command of the field is one of indescribable artistry and beauty. The difficulty is in any way to make this knowledge of general avail. At least, it is a duty to make the attempt.

Our immediate task is clear. Taking into account the great diversity of the peoples of the world, it is impossible to secure any general agreement. We have to consider ourselves and set the best possible example we can. We are now at a supreme crisis in our affairs. The question, which demands an instant answer is whether or no we are to submit the problem of the future of our country to scientific examination and study forthwith or drift we know not where.

Considering our island assets—we have coal, tin, rain and soil to live upon; our metals are of small account. We might well conserve our coal and use only oil from outside, if manufacturing industry could pay for it; to demand an increased output is suicidal. This year has shown that even rain demands some consideration. We need a new Rivers Commission, three good men, to survey the country and show how a sound drainage scheme may be developed, both to prevent flooding and conserve supplies—even go so far as to consider the means of systematically irrigating some areas.

We are beginning to learn what food is and what it might be; moreover, that its quality may be greatly improved by properly feeding the soil, so improving the plant as food for the animal and ourselves. The subject is one of great complexity and difficulty. At present, we have little right to lay down rules, except those based upon close observation in real life. All advertisement attributing this or that virtue to special artificial foods and medicaments are likely to be misleading and are to be deprecated. The sound rule is to adhere to natural foods in a well understood variety. Idealism is to be shunned in every shape and form. Unfortunately, medical men have little knowledge of such matters and they are so ill-trained as chemists and observers, liable to be carried away by every suggestion that is made to them of a new specific.

Wasting Money

Milk is our most important food and also our great fault; to most, it is a fluid coming from the cow, and grass something green that a cow will eat. Much improvement has been effected of late years but the conditions of the cow byres are still insanitary in too many places and no proper attention is given to the food.

Milk has been discredited because of the medical officers' fear of micro-organisms. The danger of tubercular disease has unquestionably been greatly exaggerated. Unfortunately, the growth of the great milk combines is leading to a general deterioration of the raw milk supply, because of milks being mixed together, the bad with the good. This, in its turn, has brought about a demand for so-called pasteurisation, a heating process by which the organisms are killed. I am one of those whose considered opinion is against any such treatment.

We are wasting money in all sorts of directions to no real purpose—making unnecessary roads for people to race upon. We need a great public demand for an immediate full study of the milk problem in its every connection. We have reason to think that we could feed out tubercular disease from cattle; that we could feed out tubercular disease from ourselves if we had the best of milk and other food for ourselves. The milk issue is of far greater importance than was that of water supply in Frankland's day. Inquiry into milk supply is long overdue; I trust that one result of my discourse may be to aid in bringing about such study at competent hands.

Letters to the Editor

Patent Law and Chemical Plant

SIR,—We have read, with interest, the editorial note in THE CHEMICAL AGE of February 3 in relation to the working of patents in this country. May we, however, just point out one little slip that has been made, and that is that the period of four years referred to at line 26 should be three years, sub-section 1 of Section 27 of the Patents and Designs Act, 1907, relating to this matter, reading as follows:—

"Any person interested may at any time after the expiration of three years from the date of sealing a patent apply to the Comptroller alleging in the case of that patent that there has been an abuse of the monopoly rights thereunder and asking for relief under this section."

—Yours faithfully,

GEE AND CO.

Staple House, 51-52 Chancery Lane, W.C.2.

The Cataloguing of Scientific Papers

SIR,—An issue of fundamental importance is raised by the letter of "Ignoramus" on "Industrial Reaction Control and Pure Research," and the leading article on "Pure and Applied Chemistry," which appeared in THE CHEMICAL AGE, January 20 and 27 respectively. It is known that useful scientific data are being published every day only to be buried out of reach in cemeteries of books called "libraries," although the enormous extent of this waste is not yet realised. The necessity for a comprehensive index to the published facts as the basis of scientific co-operation ("Engineering," 1933, *156*, 360) is also beginning to be recognised more generally. The great obstacle is the failure to perceive the need for a thorough investigation of the bibliographical problem, and the methods of solving it.

The British Society for International Bibliography, whose hon. secretary is Mr. E. Lancaster Jones, of the Science Museum, S.W.7, was formed in 1927 for the purpose of investigating these problems and furthering the project of an international index to the literature of science and technology. Thanks to researches carried out in the Science Library, the essential facts have now been elucidated. In the light of these data even the International Catalogue of Scientific Literature, with its hundred thousand different references per annum, is dwarfed. For it appears that seven hundred and fifty thousand important articles on science and technology are published each year in fourteen thousand current journals. Of these eight thousand five hundred are available in the Science Library, which is endeavouring to build up a complete national collection of scientific literature to be available in the first place for indexing, and, subsequently, for consultation by the general public or for loan to research workers through the medium of approved scientific institutions, or industrial organisations, of which they are members.

In the attempt to index this mass of literature, three hundred periodicals issue as many abstracts or bibliographical notices as the total of published papers, but, on account of overlapping and ineffective methods, only one-third of this total is indexed and two-thirds are missed.

In a recent investigation ("Engineering," 1934, *137*, 85), undertaken by Mr. Lancaster Jones, which deserves to be regarded as the basis of scientific bibliography, he has shown that on account of the manner in which the information on industrial subjects is scattered throughout periodical literature, any piecemeal attempts to tackle the question must necessarily lead to failure. There is a small nucleus of periodicals that contains a relatively large number of articles on a particular subject, but the information is not confined to these periodicals. Indeed they contain probably less than a third of the totality of literature on the subject. The rest is scattered in a thousand periodicals, which include fewer and fewer articles as the number in each class increases. Outside the nucleus of, say, twenty journals, there is a zone, of perhaps a hundred periodicals, which together yields as many articles as the nucleus, but only at the average rate of almost one article per journal each year. Beyond this there is another zone, of some seven hundred journals, containing in the aggregate as many papers as the nucleus, but this time only at the average rate of one article in seven years. Even this does not exhaust the literature of the subject, for further articles occur from time to time in journals of almost any scope.

The old idea of indexing by subject must be abandoned; instead we must visualise the problem as a whole. We must index each periodical completely, irrespective of subject, by means of a standard classification, so that all the references can be brought together into one index irrespective of source, indexing agency or language. If this principle were adopted, the energy at present being expended in published periodical bibliographies would suffice to index the complete literature of science and technology, and this with actual economy of expanse. Existing indexing bureaux would catalogue all the articles in the periodicals, for which they were responsible, and classify those within their scope. The titles of the remainder would be forwarded, through a clearing house, to the bureaux concerned with their special subjects.

The idea of forming a comprehensive index by the co-operation of bibliographical undertakings using a standard system ("Engineering," 1933, *135*, 119) was adopted in the Science Library in 1927. Since 1896 periodical bibliographies classified by the International Decimal Classification, which is the only suitable standard, have been in existence and gradually increased in number. All these were collected and amalgamated into a card index of about half a million cards, which have now grown to two million. Together with classified entries prepared in the library, the index is being added to at the rate of one hundred and fifty thousand references per annum, a rate of increase already fifty per cent. greater than that of the International Catalogue.

In addition, the library endeavours to acquire all bibliographies on scientific and technical subjects, irrespective of their arrangement. So that probably the finest existing collection of some forty million references in this field has been gathered together. The expert scientific staff of the library undertakes to search this miscellaneous bibliographical material, and to supplement the references so gleaned by exploring the actual literature. In this way very extensive bibliographies of special subjects are issued in answer to inquiry. Subsequently the books can be lent if desired. The cost of indexing by this system on the largest scale is known by actual practice. There is thus in existence the nucleus of an index and information service, which is capable of expansion to meet any need. Further details would be gladly supplied by the British Society for International Bibliography, and those interested are invited to address difficult inquiries for bibliographies to the Science Library.—Yours faithfully,

S. C. BRADFORD.

The Science Museum, South Kensington, S.W.7.

Patents and the B.I.F.

SIR,—In view of the forthcoming British Industries Fair, I wish to draw the attention of your readers, many of whom may be exhibitors, to the danger of taking advantage of Sections 45(1) and 59(1) of the Patents and Designs Act. Under these sections an unprotected invention may be exhibited provided the Comptroller is notified on the prescribed form. An application for patent may be filed for the same invention within six months of the date of the opening of the Fair. However, no priority of date is given and anyone seeing an invention may file an application for patent in this country and other countries, and unless the first and true inventor can prove fraud, the applicant will obtain a valid patent.

A well-known patent counsel in his evidence before the Commission presided over by Sir Charles Sargeant, dealt with this matter and endeavoured to have the sections of the Act strengthened, but without success. The importance of this matter to exhibitors at the British Industries Fair cannot be over-estimated in view of the "International" attendance.—Yours faithfully,

G. DRURY COLEMAN, General Secretary.

Institute of Patentees, 39 Victoria Street, S.W.1.

British Sulphate of Ammonia Trade in 1932-33

Substantial Increase in Home Consumption

ACCORDING to the thirteenth annual report of the British Sulphate of Ammonia Federation for the twelve months ended June 30, 1933 there was an estimated increase of 79,805 metric tons of nitrogen, or about 5 per cent., in the actual production of the forms of nitrogen enumerated in the report. The production in Chile decreased by 99,200 tons, or over 58 per cent. (following a decline of about 32 per cent. in the previous year), and output in other countries increased by 179,005 tons, or 12½ per cent. The total nitrogen producing capacity in the world at the present time is estimated to be about 3,460,000 tons of nitrogen, exclusive of Chile. The "manufactured nitrogen" industry of the world thus operated at an average of about 46 per cent. of capacity. The total consumption increased by 198,125 tons, or 12¾ per cent., following on decreases of 4 per cent. last year and 17 per cent. in 1930/31, and increases for the years 1927/28, 1928/29 and 1929/30 of 20 per cent., 14 per cent. and 4 per cent. respectively.

Continental Agreements

Agreements with the most important Continental nitrogen producers and a tentative arrangement with the Chile nitrate industry were concluded in July, 1932, and as a result orderly selling was introduced into most of the world's markets. These agreements have been continued for 1933/34. The nitrogen fertiliser industry thus achieved, by its own initiative and without invoking special governmental interference, the objective sought by most of the world's industries in this time of depression; namely, a rise in prices. This end was attained without adversely affecting the world consumption as a whole; on the contrary, the total demand for fertiliser nitrogen increased by 185,000 metric tons, or 13 per cent. All forms of synthetic and by-product nitrogen fertilisers shared in the increase; the consumption of ammonium sulphate (including ammonia for mixed fertilisers) increased as compared with 1931/32 by 10½ per cent. to a record figure; cyanamide increased by 23 per cent. and other synthetic nitrogen fertilisers by 22 per cent. The world demand for Chile nitrate, however, declined by 6 per cent., reaching a new low record for recent years. In individual countries, the largest tonnage increases in nitrogen consumption have been in Japan, U.S.A. and Spain; and the greatest decreases have been in the Dutch East Indies and Egypt.

On the production side the recovery in prices has not been sufficient to check the decline in by-product nitrogen output, which was 11 per cent. lower than last year. Works which had found it uneconomic to work up their ammonia liquor at 1931/32 prices for nitrogen products have in some cases, however, again found recovering the ammonia to be remunerative at 1932/33 prices. Also, largely as a result of the European nitrogen agreements in 1932/33 and 1933/34, synthetic producers have been able satisfactorily to adjust output to sales and stock requirements. The corresponding adjustment for the Chilean industry has, however, not been possible to the same extent, so that in spite of the reduction of the output to only 70,800 metric tons of nitrogen in 1932/33, it is estimated that world stocks of Chile nitrate at June 30, 1933, were about 365,000 tons of nitrogen, representing an excess above normal stock requirements equivalent to more than two years' world consumption at the present rate.

An enormous decline in the United States' output of sulphate, due to the depression in the steel industry mentioned in last year's report, was even more marked in 1932 and that country, as in 1931, remained on balance a large importer. An increase in the rate of output has, however, been noticeable since May, 1933.

Home Production

The figures in the following table showing the total production of ammonia products, expressed as sulphate, are calculated on the basis of 25 per cent. ammonia (about 20.6 per cent. nitrogen). The figures for sulphate of ammonia production and trade, however, apply to actual tons of product with a nitrogen content varying from an average of about 20 per cent. in the earlier years to about 21 per cent. in recent years.

PRODUCTION IN GREAT BRITAIN AND IRELAND.
(Tons of 2,240 lb.)

Calendar Year.	Included in the Total.		
	Total Great Britain and Ireland).	Industrial Ammonia Products (basis 25 per cent. ammonia) (*e*).	Sulphate of Ammonia as such (actual tons of product).
1913 ..	423,966	66,375	365,000
1918 ..	423,900	173,261	257,946*
1923 ..	441,216	49,614	387,612
1928 ..	644,836	63,258	564,180
1929 ..	943,537	70,520	840,396
1930 ..	803,960	89,328	678,442
1931 ..	653,319	86,156	524,651
1932 ..	771,480	85,505	628,349

* Excluding the ammonium sulphate converted into ammonium nitrate for munitions, which is included in the previous column under "Industrial Ammonia Products."

(*e*) Estimated.

Home Agricultural Consumption

Home consumption of sulphate of ammonia showed an increase on the 1931/32 figures of 10,305 tons, or 4.5 per cent. The total, 238,643 tons, almost reached the record level of 1918/19. Sales to merchants and mixers were, in fact, 9,500 tons higher than the figure shown for consumption; but as this extra tonnage represented deliveries to these buyers in the last six weeks of the fertiliser year, above their usual requirements at this period of the consuming season, it has been assumed that these delieveries were not for re-sale—*i.e.*, for ultimate consumption—in the fertiliser year 1932/33. Whilst consumption in England and Wales and in Scotland continued to progress beyond the totals for recent years, in Ireland the remarkable advance recorded in 1931/32 was not fully maintained. In view of the economic difficulties, however, it is surprising that the retrogression was not greater. Foreign imports amounted to only 226 tons, against 14,187 tons in 1931/32. The decrease was partly due to the effect of the 20 per cent. import duty which came into force on April 26, 1932. The total consumption of pure nitrogen in the British Isles for all purposes amounted to about 75,600 metric tons against 74,900 tons last year. The tonnage used in industry is estimated at 17,300 tons, against 16,600 last year. The total consumption of Chile nitrate is estimated at 21,700 tons as against 36,600 tons for last season.

Total exports from Great Britain and Ireland show a decrease of 40,584 tons, or about 10.8 per cent., on last year's figures, but during the year there has been a further reduction in the stocks on hand in export markets.

Propaganda Work

In July, 1932, the home agricultural price index figure was only 6 per cent. above the average of 1911-13, and throughout the year the monthly index hovered just above the pre-war level until by June, 1933, it actually reached the basic figure. This was the lowest post-war yet recorded. For this the decline in the prices of potatoes and fat cattle was largely responsible. A certain amount of State assistance has been given to agriculture during the year, but the wheat subsidy, which amounted during 1932/33 to more than £2½ million, was necessarily used by farmers for liquidating part of their heavy debts to merchants and banks. Circumstances were thus by no means favourable to the maintenance of fertiliser sales, and had it not been for the low prices ruling for sulphate of ammonia, there would probably have been a considerable fall in consumption. That an increase was

obtained must, therefore, be regarded with additional satisfaction.

The staff of agricultural representatives has been kept at full strength, and the desirability of increasing it is under consideration. It has maintained close contact with merchants, agents and farmers, special personal attention having been given to merchants' travellers, to whom detailed information and advice on the use of ammonium sulphate has been regularly supplied. At lectures, local cinema shows and farm demonstrations, the attendances have been satisfactory. At least 220 lectures have been given to a total of over 10,000 people. The records available show that the numbers of farmers and of merchants visited during the year under review are at least as high as formerly.

The Jealott's Hill Research Station now ranks amongst the leading institutions of its kind in the world, and during the 12 months ended June, 1933, 2,775 visitors were welcomed from all over the country; in addition, 100 agriculturists from overseas visited the experimental farm. The Research Station now issues a monthly bulletin to official and educational agriculturists throughout the world. This publication aims at giving an account of current work conducted at home and abroad on questions of fertiliser science and practice.

At June 30, 1933, the Federation consisted of 247 members, and their production for the calendar year was 92½ per cent. of all the sulphate of ammonia manufactured in the British Isles.

The Dyestuffs Bill

House of Commons Criticises the Cartel

WHEN the Dyestuffs (Import Regulation) Bill came before the Standing Committee of the House of Commons on February 5, protests were made at the short notice given to the members and to the industry that the Bill was to be dealt with in Committee.

Mr. H. HOLDSWORTH (Bradford) moved the adjournment of the Committee on the ground that there was no immediate hurry about the Bill, which dealt with an important industry and would make tremendous changes. They would be dependent for its good working on those in the industry, and these people should be properly consulted.

Dr. E. L. BURGIN (Parliamentary Secretary to the Board of Trade) replied that there was no new proposal in the Bill, which simply carried out the report of the Imports Advisory Committee presented last July.

Several other members protested against the short notice they had been given, including Lieut.-Commander F. W. Astbury (Salford), who complained that the Bill was being rushed through the Committee of the House before those whose interests were really at stake could have a fair chance to state their case.

Dr. Burgin denied that there was any desire to rush the Bill, and it was eventually agreed to discuss only the first clause, dealing with the permanence of the Bill and to consider the remaining clauses next Tuesday.

Mr. RHYS DAVIES (Westhoughton) moved an amendment that the Bill should continue in force until Parliament otherwise determines. He said there was a substantial charge to be made against the people who had monopolised the dyes and colours in this country.

Mr. J. R. REMER (Macclesfield) moved an amendment to give the Act force for three years. He said that an objection of the users was that they would have to go before the Committee to get a licence to import dyes not made in this country, and would have to give away their trade secrets to their competitors.

Mr. H. G. WILLIAMS (Croydon) pointed out that the most prosperous section of the textile trade since 1931 was the colour-using section, and there was not much substance in the arguments against the Bill being made permanent.

Lieut.-Commander ASTBURY explained that he had supported the original Imports Duties measure because at that time this country manufactured no dyes. It was thought that with protection we should be able to make dyes as good as the Germans and Swiss, and as cheap, but after ten years, Imperial Chemical Industries, along with the British Dyestuffs Corporation, which they took over, had failed to do what they intended to do. They were not making the essential colours needed by the industry, which had to pay absurd and inflated prices. If this Bill were made permanent Imperial Chemical Industries would become dictators of prices in this country.

Mr. A. DUFF COOPER (Financial Secretary to the War Office) said it was the opinion of all the Services that, from the point of view of national security, a flourishing and healthy dye industry was essential. At the beginning of the war this country suffered terribly and ran grave risks owing to the lack of such an industry, and if there were no other reason, considerations of national security would make it essential to have an Act of this sort to enable the industry to continue.

Mr. HOLDSWORTH replied that they had been told that ten years would be sufficient to build up an efficient dye industry. Since the formation of the cartel, prices had risen and were continuing to rise. It was not essential for national security that the industry should belong to one monopoly.

Dr. BURGIN replied that all the criticisms would be considered, and if the cartel was doing anything it should not, it would be watched and dealt with. There were producers and distributors to consider, and in the case of the dye industry they had to think of national defence. Also there was the very big question of policy in the employment of trained chemists in an industry where research and discovery might be likely. If the industry, since 1920, had made up its mind unanimously what was the best the Government would have had no option but to implement that report, but year after year there had been an inability to agree within the industry itself. If this Act were not in force the cartel might have been formed without this country being a party to it.

Mr. RHYS DAVIES poured scorn on the idea that the Board of Trade was the consumers' friend, and that that Imperial Chemical Industries had a bigger political pull with the Government than the Lancashire textile trade. What was the good of thinking of national security and an efficient service to protect industry if there were no industry left to protect?

The first clause of the Bill, making the Act of 1920, as amended by this Bill, a permanent Act, was carried.

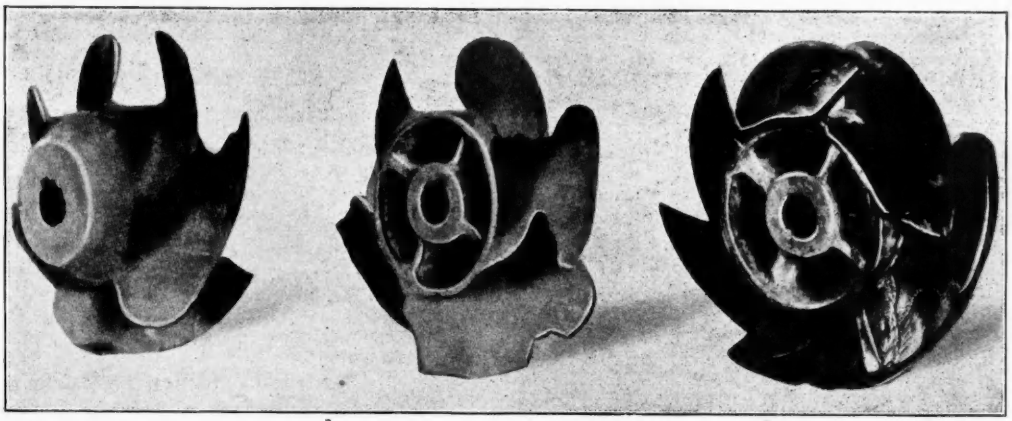
Deaths at British Celanese Works

Due to Diethylene Dioxide

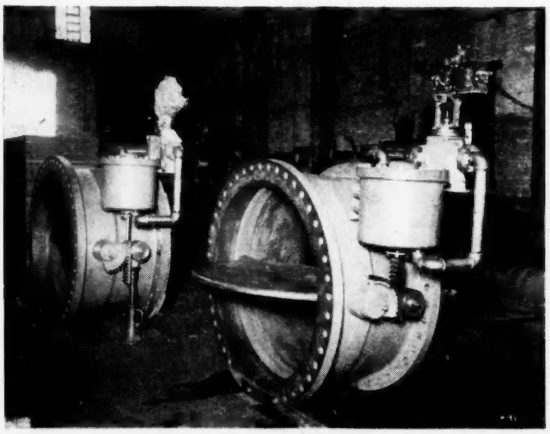
IN the House of Commons on February 6, Mr. Emrys-Evans (Derby, Southern) asked the Home Secretary whether the experiments had made it possible to identify the particular chemical which was responsible for the deaths of the workmen employed at the British Celanese factory at Spondon.

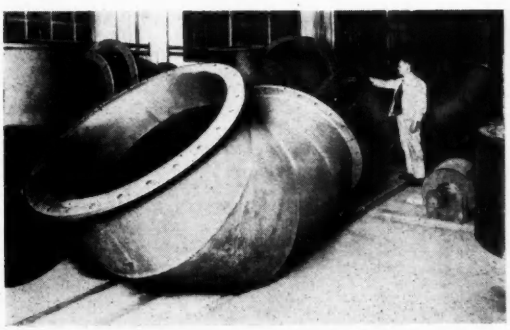
In reply, Sir J. Gilmour said it could now be stated that the particular chemical in question was di-ethylene di-oxide, otherwise known as dioxen. Investigations were proceeding as to the degree of toxicity of this substance with a view to determining under what conditions, if any, it could safely be used.

EXPORTS of potash from Germany recovered during the third quarter of 1933 much of the loss reported for the first half of the year. While total deliveries for the first nine months were only 4 per cent. less than those of the corresponding period of the previous year, the loss in declared value was 18 per cent.



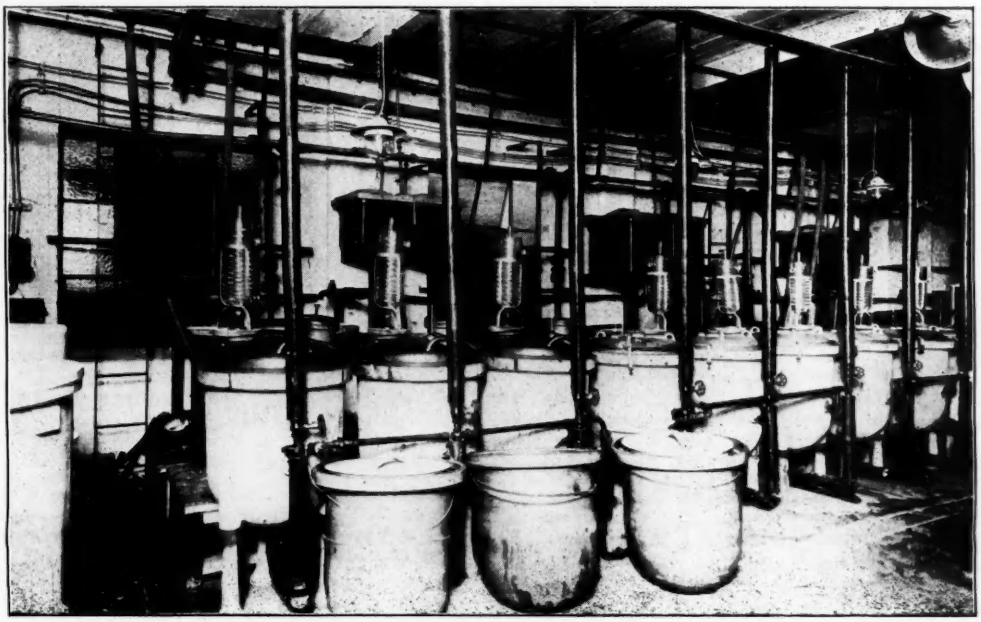
Rubber-covered impellers give four to five times the life of uncovered iron or steel when used for gases carrying abrasive dust. (Ramsden and Murray, Ltd.)





Large ducts for acid gases, such as sulphur dioxide, have proved satisfactory when rubber-lined. (Dunlop Rubber Co., Ltd.)

(*Left*) Rubber-lined butterfly valves are used for coke oven gas or dusty flue gases. (Ashmore, Benson, Pease and Co., Ltd.)



Ebonite-lined vessels find application in the manufacture of disinfectants. (Dunlop Rubber Co., Ltd.)

Reproduced from "Rubber in Chemical Engineering," published by The Rubber Association, Inc. 1933.

Notes and Reports from the Societies

Midland Chemists' Committee

Annual Dinner and Dance

THE annual dinner and dance organised by the Midland Chemists' Committee (representing the local sections of the Society of Chemical Industry, the Institute of Chemistry, the British Association of Chemists, the Chemical Society, and the Birmingham University Chemical Society) was held at the Midland Hotel, Birmingham, on February 3. The dinner was preceded by a reception by Mr. and Mrs. W. A. S. Calder.

The toast of "Midland chemists" was proposed by Professor J. F. Thorpe (president of the Institute of Chemistry) who pointed out that what was needed among chemists was cohesion without coercion. The sectionalised condition of chemists in this country, provided the sections were in close touch with one another, was better than the massed production of chemists which existed in the United States. The various branches of chemistry had their own particular work to do, and no doubt in the next year or two they would be able to evolve a scheme by which there would be considerable cohesion between the various branches of science. Everything which tended to jealousy must be avoided.

Mr. W. A. S. Calder, chairman of the Chemical Engineering Group of the Society of Chemical Industry, responded.

British Association of Chemists

Manchester Section : Professional Organisations in Industry

A MEETING of the Manchester Section of the British Association of Chemists was held at the Grand Hotel, Manchester, on January 24, when Mr. R. Brightman, M.Sc., F.I.C., opened a discussion on "The Place of Professional Organisations in Industry."

Professional organisations, said Mr. Brightman, lagged a decade or more in their outlook, and reactions to new ideas and problems lay behind the more progressive individuals of whom the organisations are composed. In spite of admirable relations between industry and scientific organisations, the latter made little effort to shape their policy in relation to conditions and problems of modern industry. Four main tendencies are easily discernible in modern industry. In the first place there was the growth in the scale of enterprise and in the size of the industrial unit; secondly, the growing complexity of modern industry with respect to both internal and external problems; thirdly, the transfer of management from the entrepreneur to the technical and professional man; and fourthly, the increasing extent to which industry is imbued with the spirit of service, illustrated in the increasing co-operation between manufacturer and user. These four tendencies are of fundamental importance in considering the position of professional organisations in industry.

The need for defence organisations is still great, as the experience of the British Association of Chemists has shown. Professional organisations have always been interested in education and in this direction there remains great scope to assist in planning educational policy in accordance with industrial requirements. The question of industrial safety is also one which professional organisations should consider as within their sphere, although the most effective work will be carried out by individuals inspired by ideals of public service.

The growing influence of professional men in industry, continued Mr. Brightman, makes it essential that professional organisations themselves should be animated by the highest professional traditions. Alternatively, only professional organisation can secure to the individual that independence in which such ideals flourish. Chemists, like other professional men, have failed to grasp the changes in the industrial structure and the place of their professional organisations in it, but the adoption of aims and ideals which put before everything else the ideal of service to the community, as in the case of the British Association of Chemists, must invigorate this profession with a new energy.

Institute of Fuel

Informal Discussion on Large and Small Coal

AN informal meeting of the Institute of Fuel will be held at St. Ermin's Hotel, Caxton Street, London, on Thursday, February 22, at 6.30 p.m., when the subject for discussion will be "Should Large Coal be Crushed to meet the Increasing Demand for Smalls." The discussion will be opened by Mr. J. Stanleigh Turner, of the Moira Colliery Co., Ltd., who will speak from the producer's standpoint. He will be followed by Mr. John Charrington, junior, speaking on behalf of the coal distributors and Mr. John Bruce, of the County of London Power Co., who will voice the requirements of the large users.

Visit to Confectionery Works

By the courtesy of J. Lyons and Co., Ltd., arrangements have been made to visit Cadby Hall, Hammersmith and Greenford, Middlesex, on Wednesday, February 28, and also on Wednesday, March 14. Each of these visits is limited to a total of 60 members and friends. At Cadby Hall, the baking of 5,000 loaves per hour, in automatic ovens, will be seen, together with the manufacture of breakfast rolls, confectionery and ice cream; at Greenford, the manufacture of chocolates, preparation, blending and packing of tea and coffee will be on view. Motor coaches will leave St. Ermin's Hotel, Caxton Street, Westminster, at 10 a.m. on each of these dates. Tickets for these visits, including lunch at the Regent Palace Hotel, can be obtained from the Secretary of the Institute of Fuel, 53 Victoria Street, S.W.1, at 7s. 6d. per head.

Society of Chemical Industry

Road Building Materials Group

THE first meeting of the recently-formed Road and Building Materials Group of the Society of Chemical Industry will be held at the Society's Rooms, Burlington House, London, on February 14. This meeting has been arranged jointly with the Plastics Group. "An Ostwald Viscometer for Tar" will be the subject of a paper by Dr. A. R. Lee, of the Chemical Research Laboratory, and "The Measurement of the Properties of Plastic Road Surfaces" will be dealt with by B. G. Manton and W. G. Wren. These papers will be followed by the exhibition of a film showing the Taylor road testing machine for measuring the resistance to deformation of paving mixtures.

Newcastle Section : Aromatic Vat Dyes

A JOINT meeting of the local sections of the Society of Chemical Industry and of the Institute of Chemistry was held at Armstrong College, Newcastle-upon-Tyne, on January 31, when Dr. Fraser Thompson, research manager to Scottish Dyes, Ltd., Grangemouth, gave a lecture on the complex aromatic vat dyes with special reference to Caledon Jade Green. The manufacture of phthalic anhydride was also discussed, and the dispersive action of wetting agents on insoluble dyestuffs was demonstrated by experiments. Many of the less known properties of jade green were mentioned and also shown experimentally.

The lecturer emphasised the great developments that have taken place during the last fifteen years in dyestuffs, manufacture and research. He described the chemical reactivity of the peripositions in naphthalene and its more complex derivatives such as benzanthrone, and gave an account of the development of the two dibenzanthronyls and their behaviour to further reagents. They are products complementary in character. Thus, mild oxidation of benzanthrone in acid medium produces (in terms of international nomenclature) 3.3^1-dibenzanthronyl, transformed by mild potash treatment to dibenzanthrone, which on acid oxidation yields 16.17-dihydroxy dibenzanthrone. Working in the reverse order, the mild potash treatment of benzanthrone yields 4.4^1-dibenzanthronyl, transformed by acid oxidation direct to 16.17-dihydroxydibenzanthrone.

The history of the discovery of the alkoxy-derivatives of 16.17-dihydroxydibenzanthrone was also sketched, and the properties of the hydroxyquinone were strikingly illustrated by experiment. The properties of the dimethoxy derivative (Caledon Jade Green) were also described and in particular the nature of its compound with sulphuric acid was illustrated by a lantern experiment, where it was shown that oxidising agents such as nitric acid convert the red violet substance instantly to a brilliant green.

A series of lantern slides illustrating the history of the Carlisle and Grangemouth developments of Scottish Dyes, Ltd., was shown. Short references were made to the solubilised (Soledon) dyestuffs and to the preparation of easily dispensible powder brands, with demonstrations. A large collection of samples of highly crystalline anthraquinone derivatives was also on view.

The annual dinner of the local chemical organisations will be held in the Royal Station Hotel, Newcastle, on Friday, March 16.

Bristol Section : Gas as Substitute for Petrol

SOME of the effects on various industries that would follow the extended application of town's gas to the running of commercial vehicles were discussed in a lecture given by Dr. C. M. Walter, director of the Research Laboratory of the Birmingham Gas Department, on the occasion of a joint meeting of the Bristol Section of the Society of Chemical Industry and the Institute of Fuel, on February 1.

Dr. Walter's subject was the industrial application of town's gas, with special reference to its employment as a substitute for petrol for the running of commercial vehicles, but he took the opportunity afforded him to indicate what the use of gas as a substitute for petrol would mean to the steel industry and other industries if that portion of petrol employed by the organised transport services—the railway companies, the municipalities and the road transport companies—for carrying passengers and goods were replaced by gas. The amount of petrol used for these organised services, from statistical information in his possession, appeared to be about a hundred million gallons a year. If that quantity of petrol were replaced there would be used, possibly, something like twenty-five thousand million cubic feet of gas—an amount almost twice the output of the Birmingham Gas Department. That meant an increased consumption of 1,700,000 tons of coal which would yield about one million tons of coke.

Earlier in his address Dr. Walter spoke of the enormous increase in the use of gas for industrial purposes that had taken place not only in Birmingham but also throughout all the industrial centres in the country where special facilities have been afforded to manufacturers with regard to the method of application and carrying out experimental work to ensure the use of gas in the most economical manner. It had always been recognised, of course, that Birmingham had taken the lead in the development of gas industrially, for the establishment of a special department in the city to deal with this particular application of gas dated back to 1909, when a very small laboratory was fitted up to investigate how far gas could be used with advantage in some of the many thousands of manufacturing processes carried out. As a comment on that enterprise Dr. Walter mentioned that the present annual output of gas in Birmingham for purposes other than domestic was four thousand million cubic feet. This figure represented ten times the output in the year ended March, 1911.

Birmingham Section : Current Problems in Catalysis

CERTAIN asepects of the current position of various problems in heterogeneous catalysis, especially the nature of the catalysing surface, were dealt with by Dr. E. B. Maxted, in a paper read before the Birmingham Section of the Society of Chemical Industry, on January 25. Recent work on the mechanism of catalysis, and the correlation of reaction velocity in catalytic reactions with other factors, was also discussed.

Taylor's theory of peak areas, Dr. Maxted stated, has been developed by Pietsch, Schwab and others, in a number of papers on adlineation, into a conception involving preferential adsorption of catalysis at one-dimensional solid-phase discontinuities such as crystal edges or discontinuities associated with the presence of a further solid phase. The adlineation theory is not inconsistent with the energetic equivalence of the preferentially adsorbing or reacting elements of the crystal lattice; and in the evidence for this homogeneity has been examined in various ways. These have included the question of the variability of the differential heat of adsorption of gases at the surface of metallic catalysts. While earlier work apparently indicated a variation in this heat effect with the adsorbed concentration at which a given small gas increment was added, later investigators, including the author, have, by the elimination of experimental errors, found a constant value for the differential adsorption heat.

Criteria for the energetic homogeneity of the catalysing points has also been sought in the constancy of the activation energy for a catalytic reaction proceeding at a progressively poisoned surface, from which the effective action of any postulated peak areas has been removed by their successive occupation by the poison. Further evidence is obtained from the form of the graph connecting the activity with the poison content, whilst another method of investigation has consisted in the examination of the possibility of reducing the activity of the catalyst, by partial poisoning, to a stage at which it ceases to be active for certain reactions while it retains its power of catalysing others. Provided that care is taken that the system is originally poison-free, the poisoning coefficient was the same throughout the reactions studied; and no preferential suppression of activity of the above nature could be detected.

In the second part of this paper, Dr. Maxted spoke of the general approach to catalytic theory by way of the energetics of the processes involved, and of the tunnel theory of Born and Franck, which involves the quantum-mechanical probability of the penetration of the energy hill, by virtue of retention effects, in place of its ascent. Reference was made to the strain theory of Balandin, to the general depression of the activation energy by catalysts, to the source of the activation energy in transitory energy displacements, and to the connection of the thermionic work function with activity. Finally, certain anomalies connected with the velocity of catalytic reactions were cited, and examples were given involving the correlation of the activation energy with the experimentally observed difficulty of reaction, with the reaction constant and with the constant in the Arrhenius equation which expresses the intrinsic activity.

Glasgow Section : Developments in Fuel Research

A JOINT meeting of the Glasgow Sections of the Society of Chemical Industry and the Institute of Chemistry was held in the Royal Technical College, Glasgow, on February 2, when Dr. F. S. Sinnatt gave an address on "Some Recent Developments in Fuel Research." Professor R. M. Caven was in the chair.

Dr. Sinnatt said that up to the formation of the Fuel Research Board no systematic investigation or survey had been made of the coal seams of this country. One of the major programmes of the Board was to make a complete examination of all the coal fields. British coals range in rank from anthracite to lignite and therefore each coal field demands the attention of a special survey staff. The problems can only be solved by officers making frequent visits to the collieries to have consultations with the technical staffs of the collieries. Up to the present some seventy seams have been investigated in the country, either partially or completely, and each seam has been found to exhibit characteristic variations in properties from locality to locality. The survey has shown that the properties of coals in certain coal fields change systematically, and it is possible to plot on a map the percentage of volatile matter and the tar produced on carbonisation, etc., and thus reduce the number of points at which seam sections are obtained. In other areas it is necessary to make a much more detailed study. It will be recognised at once that the economical utilisation of coal depends upon the complete knowledge of its properties in any point of the coal field. It is not possible for the Coal Survey to do more than generalise upon the variations which are occurring, and collieries are becoming alive to the need for anlysis of the coal seams they are winning in order to detect minor variations. The survey of a seam is not considered complete until consignments selected with the greatest care from the coal field have been examined in the large-scale units at the Fuel Research

Station. By this means it is possible for those engaged in the utilisation of coal to translate the variations found in the laboratory into large-scale practice.

Experiments which had been conducted at the Fuel Research Station on the hydrogenation of coal and tar were also described by Dr. Sinnatt, who stated that the progressive hydrogenation of coal in the presence of a suitable catalyst gave initial products rich in phenols and final products containing only hydrocarbons. The plant in use at the Fuel Research Station for the hydrogenation of low temperature tar and distillates from high temperature tar is capable of treating 50 litres per day and the motor spirit produced from low temperature tar is rich in aromatic hydrocarbons and has an octane number of 88.

The purification of fine coal was a third aspect of fuel research which was dealt with by Dr. Sinnatt. He described briefly the work which has been done upon the vacuum froth flotation and the precipitation of fine coal from suspensions in water. He pointed out that at the Fuel Research Station the vacuum flotation method had been considerably improved, for the treatment of certain coals, by addition of coagulating agents which caused the precipitation of the fine impurities which may otherwise be carried over with the clean coal. In the vacuum flotation process the coal separates as a froth which, when the pressure is adjusted to atmospheric, collapses and yields a product which drains rapidly.

Pharmaceutical Society

Lecture by Professor Mellanby

THE fourth evening meeting of the Pharmaceutical Society this session will be held at 17 Bloomsbury Square, London, on February 13, when a lecture on "The Influence of Some Nutritional Factors in Disease" will be given by Professor E. Mellanby, F.R.S., secretary of the Medical Research Council, Professor of Pharmacology, University of Sheffield. Until twenty-five years ago diseases were in the main classified as due to bacteria or to tumours. Since then a group of deficiency diseases has been recognised. Professor Mellanby has played an important part in this work by his demonstrations that rickets is a deficiency disease cured by a fat soluble vitamin, and that various nervous diseases are also dietary in origin. The chair will be taken by the president at 8.30 p.m.

The Chemical Society

Pedlar Lecture

PROFESSOR DR. HANS FISCHER will deliver the fourth Pedlar Lecture, entitled "Chlorophyll," in the lecture theatre of the Royal Institution, Albemarle Street, London, W.1, on Thursday, February 22, at 8 p.m. Admission is free, without ticket.

Electrodepositors' Society

Presentation to Dr. S. Wernick

THE annual dinner and dance of the Electrodepositors' Technical Society was held on February 2, at the Comedy Restaurant, Haymarket, and was marked by an interesting presentation of an engraved silver cigarette case with cheque to Dr. S. Wernick in recognition of over seven years of continuous service as hon. secretary. The toast of "The Society" was proposed by Mr. S. Field, first president. He said that not one of the small band who founded the Society in November, 1925, could have predicted the remarkable progress which had been steadily made. To-day, the Society was known all over the world, and its published work was of international importance.

Mr. A. W. Hothersall proposed the toast of the Midlands Centre. The latter had only been inaugurated a few months ago, yet the Birmingham meetings were extremely well attended by enthusiastic members.

Mr. E. A. Ollard, vice-president, made the presentation to Dr. Wernick. He said that the main work of the Society devolved on its secretary, and much of its success was due to the whole-hearted manner in which Dr. Wernick had carried out his work.

Dr. Wernick, in reply, said the assistant hon. secretary, Mr. G. E. Gardam, deserved quite half the praise.

Institution of the Rubber Industry

London Section : Conveyor Belting

THE London and District Section of the Institution of the Rubber Industry will hold a meeting at the First Avenue Hotel, High Holborn, W.C.1, on Monday, February 12, at 7.30 p.m., when Mr. R. Huxley, of the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., will read a paper on "Conveyor Belting." Mr. Chas. P. Hawkins will be in the chair.

Oil Refining in Canada

Increased Output Recorded

AN increased output is recorded for the oil refining industry of Canada. During the six months from June to November inclusive imports of crude oil amounted to 649,985,000 gallons, an increase of 125,914,000 gallons, as compared with the figures for the corresponding period in 1932. At the same time gasoline imports showed a marked decrease.

The average daily consumption of crude oil in Canada is approximately 95,000 barrels, of which about 3,000 barrels are produced in Canada. Some 72,000 barrels of crude oil are imported daily, and the remaining requirements are imported in the form of finished products. In the case of kerosene, Canada supplies 96 per cent. of its requirements, but only 48 per cent. of the lubricating oils used are produced in the Dominion. The principal refining organisations are all engaged in wholesaling and retailing gasoline and other oil products, and are estimated to control upwards of 85 per cent. of the total gasoline sales. Many of the Canadian refining companies have increased their capacity in recent years. For instance, Imperial Oil, Ltd., with six refineries, is now stated to have a total capacity of 80,000 barrels daily; the British-American Oil Co. has a capacity at Toronto and Montreal of 21,000 barrels.

Manchester University

A New Chemical Engineering Course

MANCHESTER is to be the first university in Great Britain, outside London and Glasgow, to meet the need for training chemical engineers by establishing a course for that purpose. Dr. James Kenner, Professor of Technological Chemistry at Manchester University said the new course of chemical engineering comes under the Department of Applied Chemistry, which hitherto has comprised courses on general chemical technology, metallurgy and assaying, fermentation processes (including brewing), electro-chemistry, photography, colouring matters, foodstuffs, and fuels. An examination of the new syllabus of Manchester shows that the first two years of the course will be identical with the corresponding period of the course for general technological chemistry already in existence. It is in the third year that the engineering innovation has been made, comprising design and operation of unit types of chemical plant; work in the chemical engineering laboratory; mechanical properties of fluids; and heat transmission.

The first problem which confronts Professor Kenner and his staff is the provision of suitable machinery and plant. The Manchester Oxide Co. has given a rotary vacuum filter; S. H. Johnson, of Stratford, London, have presented a filter press. Amongst plant units still required, and for which Professor Kenner has been getting some quotations, are a vacuum pump, hydraulic equipment, evaporator, centrifuge, film towers, heat transfer equipment, emulsifier, disintegrator, colloid mill, electrical precipitator, and ball mills. To purchase this plant about £1,500 will have to be provided.

News from the Allied Industries

Paint and Varnish

GOODLASS, WALL AND CO. state that the fire at their paint works at Old Swan, Liverpool, on January 31, was confined to the new varnish factory in process of completion. The existing varnish plant sustained only very slight damage. The main factory dealing with the manufacture of enamels, hard gloss paints, cellulose lacquers, and colours, was undamaged, and is functioning as usual.

Non-Ferrous Metals

A MARKED INCREASE in the export of nickel from Canada during 1933, as compared with 1932, is shown in figures compiled by the Dominion Bureau of Statistics. The gain amounted to $15,512,004, or 212 per cent. The export in 1933 was as follows, the figures in brackets being those of 1932: Nickel in ore, matte or speiss 383,253 cwt., (151,692); fine nickel, 420,492 cwt. (151,655 cwt.); nickel oxide, 76,646 cwt. (17,372). The total value of the 1933 export of nickel was $22,796,968, against $7,283,964 in 1932.

Artificial Silk

IT HAS BEEN SUGGESTED that the recent strikes in the rayon industry have been occasioned by reductions of wages to the workers, thereby enabling prices to be lowered. It is understood that this is not true so far as Courtaulds, Ltd. are concerned. The wages paid to-day in the firm's factories are stated to be the highest, not only in the rayon industry, but probably in any form of textile spinning.

WORLD RAYON PRODUCTION during 1933 is estimated to have amounted to 284,305 metric tons, against 235,715 metric tons in 1932. The United States, Britain, Japan, France, Germany, and Italy all showed increased outputs, with 78,230 (59,585) metric tons, 38,220 (32,960) metric tons, 40,875 (29,270) metric tons, 26,000 (21,480) metric tons, 31,000 (29,400) metric tons, and 37,290 (31,885) metric tons respectively. Japan, with her output over half the amount produced in the United States, is now second on the list of world rayon producers. Belgium, Czechoslovakia, and Switzerland each showed a reduced production.

Continental Chemical Notes

PRODUCTION OF BITUMEN ANTI-CORROSIVE PAINTS has been started up by a Warsaw firm which has acquired the Polish rights for "Bitumastic."

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INCREASED MAGNESITE DEMAND is reported by the Magnesit-Industrie A.G., of Pressburg, who estimated their 1933 output at 135 per cent. of the 1932 figure.

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GOVERNMENT SUBSIDIES are to assist the establishment of a titanium white industry in Japan. This pigment has been entirely imported in the past to the annual value of more than 300,000 yen. Participants in the scheme are the Shai Industrial Chemical Co. and the Dai-Nippon Artificial Fertiliser Co.

* * *

THALLIUM COMPOUNDS are being manufactured in conjunction with lead and zinc metals by the Belgian Société de la Vieille Montagne. It is expected that large quantities of these compounds will be shortly available for a wide range of manufactures, including special alloys, rat and insect poisons, medicinal preparations, fabric finishing materials and moth-proofing agents.

* * *

INVESTIGATIONS OF THE EXPLOSIVE PROPERTIES of solid acetylene, a product which has formed the subject of many patents of the I. G. Farbenindustrie in recent years, as summarised in the "Chemische Fabrik" of January 24, show it to be highly resistant to impact and friction. In shattering power (brisance) it is roughly comparable with ammonium nitrate explosives. The detonation velocity of 2,500 to 2,600 metres per second is relatively low, on the other hand, and does not quite equal that of cheddite.

* * *

THE FIRST REALLY EFFECTIVE ABSORBENT for mercury vapour is announced in the form of iodised carbon which exhibits optimum absorptive action when iodine is present to the extent of 5 per cent. ("Angewandte Chemie," January 27). The discovery can be exploited either in the form of a respirator or by scattering a thin layer of the iodised carbon (not more than a few millimetres) on tables, floors and drawers in laboratories where mercury is in constant use. A thin layer scattered over the surface of mercury which, for experimental reasons, is unavoidably kept for long periods in open containers, also effectively prevents accumulation of mercury vapour in the atmosphere. It is remarkable that the quantity of iodine given off from the preparation at normal temperatures is far too small to cause any risk to the health of human beings.

IT HAS BEEN DECIDED by the American Du Pont concern to open a sales office in Prague with a view to maintaining more effective contact with the south-east European market.

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HYDROGEN PEROXIDE, perborate, ether and other chemicals will be manufactured by a new Spanish concern, the Union Química Española, which takes over the plant at Leon of the bankrupt Soc. Leonesa de Productos Quimicos.

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A SOVIET SHALE OIL REFINERY in the central Volga region will shortly commence operation, reports "Metallbörse." Shale deposits with an annual output of 1.1 million tons of oil shale are available but it is estimated that only 250,000 tons will be delivered in the present year.

* * *

A SWEDISH ASSOCIATE of the Norsk Aluminium Co. is erecting an aluminium factory at Avesta, which is expected to be in operation in the autumn of this year. The requisite power of the estimated order of 450 kilowatts, will be supplied by the neighbouring Alby Nya Chlorate Factory, and aluminium oxide will be imported from Norway.

* * *

AN ALUMINIUM FACTORY is being erected by the Budapest subsidiary of the Bauxite Trust, which has its headquarters in Zurich. Another sign of activity in this industry in Hungary is revealed by the recent application of the Manfred Weiss A.G. for a State subsidy to facilitate the establishment of an aluminium factory.

* * *

A PAPER-BITUMEN COMPOSITION (Cellasa) is now used in Germany as a substitute for iron in pipe line manufacture owing to its superior resistance to the corrosive action of acids, salt solutions and acid soils. According to the "Chemische Fabrik," January 24, the specific gravity is only one-third of that of steel tubes.

* * *

RECENT INVESTIGATIONS on the mechanism of cellulose acetylation described by Krüger and Roman in "Angewandte Chemie" (January 27) are stated to lend support to the theory of Brönstedt. Observations of the catalytic action of hydriodic, hydrochloric, perchloric and phosphoric acids, above all the latter acid in the presence of sodium perchlorate, point to the intermediate formation of a salt-like "critical complex." This intermediate is a compound of the basic part of the cellulose molecules (probably the bridge oxygen atoms) with the acid catalyst. The authors conclude in addition that undissociated acid molecules play an important part in the catalytic effect.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

INDUSTRIAL chemicals have been in fair demand during the week, chief interest being shown in acetone, ammonium chloride, formaldehyde, formic acid, oxalic acid, acetic acid, lithopone and caustic soda. Arsenic continues to be an unsatisfactory item and there is not much business in copper sulphate. Prices of a number of sodium products have been reduced. Fertilisers are in steady demand and price have remained unchanged. In the coal tar products section there has been an increased inquiry for pitch. Business in pharmaceutical chemicals has been on a moderate scale and the essential oils market has been fairly active.

LONDON.—There are no alterations in prices to report. Prices remain very firm and the improved demand for chemicals generally is maintained. There is no change in the coal tar products market from last week, prices remaining firm and unchanged.

MANCHESTER.—Reports as to conditions on the Manchester chemical market this week have been rather mixed. New contract commitments in some of the textile chemicals for the bleaching, dyeing and finishing establishments in Lancashire have, it is reported, been adversely affected by the uncertain outlook in the cotton trade, but in the case of the woollen and rayon trades and in a number of other directions the movement of chemicals is little if at all below what it has been since the turn of the year. The alkalies and some of the potash and magnesium products, as well as the heavy acids, have met with a fairly steady call, and certain of the tar by-products, also, are being taken in fair quantities. There has been relatively little change in the general price position of heavy chemicals, and the market view is that with odd exceptions the outlook may be regarded as steady. With regard to imported materials, much, of course, will depend upon the exchanges.

SCOTLAND.—The Scottish heavy chemical market has shown considerable improvement over the last week.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £15 10s. per ton; powder, £28 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%. 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£7 to £8 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¼d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 to £36; brown, £31 10s.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised Industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. to 8¾d. according to quantity in 2-cwt. drums; B.P., 9d. to 9¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8½d.

RUPRON (MINERAL RUBBER).—£16 10s. per ton.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks. Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. net.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SODIUM SILICATE.—140° Tw. Spot £8 per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.

SULPHUR.—£10 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

Pharmaceutical and Fine Chemicals

Prices of pharmaceutical and fine chemicals remain unchanged, except as reported below:—

COCAINE.—Alkaloid and Citrate, home trade, 27s. 4d. to 29s. per oz.; hydrochloride and nitrate, 25s. to 26s. 8d. per oz.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, 2s. 4d. to 2s. 5d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 5d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification; refined, 1s. 10d. to 2s. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 10d. to 10½d. per gal.; standard motor 1s. 5d. to 1s. 5½d.; 90%, 1s. 5½d. to 1s. 6d.; pure, 1s. 8½d. to 1s. 9d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 3½d. to 3¾d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3½d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4¾d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked £10 per ton. Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PYRIDINE.—90/140, 6s. to 6s. 6d. per gal.

PITCH.—Medium, soft, £3 per ton.

REFINED COAL TAR.—SCOTLAND: 4d. per gal.

TOLUOL.—90%, 2s. 8d. per gal.; pure, 3s.

XYLOL.—Commercial, 2s. 6d. to 2s. 7d. per gal.; pure, 2s. 9d. to 2s. 10d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C. 9½d.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—4s. 3d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £11; grey, £16.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£6 10s. to £10 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 9d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 5s. per ton; export, nominal, £6 1s. 3d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 4s. per ton, carriage paid to railway station.

NITRITE OF SODA.—£7 18s. 6d. per ton nearest station.

NITRO-CHALK.—£7 5s. per ton nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON, Feb. 7.—LINSEED OIL was steady. Spot, £19 15s. (small quantities, 30s. extra); Feb., £18 2s. 6d.; March-April, £18 7s. 6d.; May-Aug., £18 15s.; Sept.-Dec. £19 2s. 6d., naked. RAPE OIL was quiet. Crude extracted, £25; technical refined, £25 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £13 10s.; refined common edible, £17; and deodorised, £18 10s., naked, ex mill (small lots, 30s. extra). TURPENTINE was very firm. American, spot, 50s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £19 per ton; Feb., £18 7s. 6d. March-April, £18 15s.; May-Aug., £19 2s. 6d.; Sept.-Dec., £19 12s. 6d., naked. COTTON OIL.—Egyptian crude, spot, £13 10s.; edible refined, spot, £15 15s.; technical, spot, £15 15s.; deodorised, £17 15s., naked. PALM KERNEL OIL.—Crude, f.m.q, spot, £15 5s. naked. GROUNDNUT OIL.—Extracted, spot, £19 10s.; deodorised, £23 10s. RAPE OIL.—Extracted, spot, £24; refined, £25 10s. SOYA OIL.—Extracted, spot, £17 10s.; deodorised, £20 10s. per ton. COD OIL, 22s. 6d. per cwt. CASTOR OIL.—Pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE, American, spot, 52s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

FUR DYEING, process.—Imperial Chemical Industries, Ltd., C. H. Barlow and L. G. Lawrie. April 20, 1932. 404,969.

DISPERSING AGENTS and preparations therefrom, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). June 9, 1932. 404,931.

DYES, manufacture.—J. D. Kendall and Ilford, Ltd. June 20, 1932. 404,997.

PENTA-ERYTHRITE, production.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. April 20, 1932. 404,975.

LIQUID HYDROCARBONS, purification.—E. D. Kamm, B. Taffs, and Imperial Chemical Industries, Ltd. June 23, 1932. 404,960.

DYESTUFF INTERMEDIATES.—Imperial Chemical Industries, Ltd., S. Coffey and R. W. Everatt. June 28, 1932. 405,003.

CHLORHYDRINS and ethers thereof, manufacture.—H. Dreyfus. July 15, 1932. 404,938.

DYEING with azo dyestuffs.—J. Hardcastle and Co., Ltd., C. S. Parker, C. L. Wall and F. Farrington. July 20, 1932. 405,005.

ACETIC ACID, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 25, 1932. 404,983.

UNSATURATED HYDROCARBONS from saturated hydrocarbons, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 25, 1932. 404,984.

ALKALI METAL HYDRIDES, manufacture.—Roessler and Hasslacher Chemical Co. July 28, 1931. 405,017.

2-DERIVATIVES OF SELENAZOLES, manufacture.—Kodak, Ltd. July 29, 1932. 405,028.

PROCESS for cleaning or clarifying liquids.—C. Q. M. Campbell. Aug. 1, 1931. 405,038.

CENTRIFUGAL APPARATUS for drying and pulverising manures and like purposes.—H. G. Hoad and J. Worthington. Aug. 2, 1932. 405,039.

PRODUCTS derived from polyhydric alcohols and polybasic acids, process for the manufacture.—Mantle Lamp Co. of America. Aug. 20, 1931. 405,054.

VAT DYESTUFF PREPARATIONS, manufacture.—W. W. Groves. Dec. 2, 1931. 405,092.

3-METHYLAL-PENTANE and 3-methylol-pentane, manufacture.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. Nov. 26, 1932. 405,141.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. April 12, 1932. 405,144.

ALKALI PHOSPHATES, production.—Boxel-Maletra Soc. Industrielle de Produits Chimiques. May 26, 1932. 405,165.

SUBSTITUTED MALONIC ACIDS, manufacture.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. June 8, 1932. 405,173.

TREATMENT OF CLAYS with acids.—W. W. Groves (Merrimac Chemical Co., Inc.). June 23, 1932. 404,991.

MILK POWDER, manufacture.—N. M. Kronberg. Jan. 9, 1933. 405,192.

SULPHURIC ACID ESTERS of glucosides, production.—H. D. Elkington (H. T. Böhme Akt.-Ges.). Feb. 10, 1932. 405,195.

Complete Specifications Open to Public Inspection

WATER SOLUBLE DIAZOIMINO COMPOUNDS and their application.—E. I. du Pont de Nemours and Co. July 27, 1932. 18638/33.

NON-KNOCKING BENZINES, production.—I. G. Farbenindustrie. July 26, 1932. 19251/33.

CARBONACEOUS MATERIALS, treatment of, with hydrogenating gases.—I. G. Farbenindustrie. July 27, 1932. 19252/33.

VAT DYESTUFF PREPARATIONS in powder form, particularly suitable for printing, manufacture.—I. G. Farbenindustrie. July 23, 1932. 20641/33.

PHENOL-ALDEHYDE RESINS, manufacture of derivatives.—Dr. H. T. Bucherer. July 23, 1932. 20710/33.

ISOTHIOCYANATE SULPHONIC ACIDS, process for the manufacture.—I. G. Farbenindustrie. July 23, 1932. 20727/33.

AZO DYESTUFFS, process for manufacture.—I. G. Farbenindustrie. July 26, 1932. 20980/33.

SODIUM ETHYL OXALACETATE and the product thereof, method of making.—U.S. Industrial Alcohol Co. July 26, 1932. 21057/33.

AZO DYESTUFFS and their manufacture.—E. I. du Pont de Nemours and Co. July 26, 1932. 21085/33.

AZO DYESTUFFS and their manufacture.—E. I. du Pont de Nemours and Co. July 27, 1932. 21130/33.

INKS, production.—E. I. du Pont de Nemours and Co. July 27, 1932. 21131/33.

ORGANIC MERCURY COMPOUNDS and their manufacture.—E. I. du Pont de Nemours and Co. July 28, 1932. 21286/33.

CITRIC ACID, process for the manufacture.—Arenella Soc. Italiana per L'Industria Dell-acido Citrico ed Affini. July 29, 1932. 21402/33.

Applications for Patents

GRINDING and emulsifying machines.—F. J. E. China and Premier Colloid Mills, Ltd. Jan. 30. 3101.

ALIPHATIC ETHERS, production.—A. Chwala and E. Waldmann. Jan. 27. (Austria, Oct. 7, '33.) 2864.

ALIPHATIC ETHERS, production.—A. Chwala and E. Waldmann. Jan. 27. (Austria, Dec. 2, '33.) 2865.

SEPARATION and recovery of olefines from gases.—Distillers Co., Ltd., W. P. Joshua and H. M. Stanley. Jan. 26. 2746, 2747.

COLOURING CELLULOSE ESTER, etc., materials.—E. I. du Pont de Nemours and Co. Jan. 25. (United States, Jan. 25, '33.) 2619.

BROMOARYLAMINES, manufacture.—E. I. du Pont de Nemours and Co., E. Havas and H. R. Lee. Jan. 25. 2620.

PYROLYSIS OF OLEFINES.—E. I. du Pont de Nemours and Co. Jan. 26. (United States, Jan. 27, '33.) 2739.

CARRYING OUT chemical reactions with circulating gases.—K. Gordon, and Imperial Chemical Industries, Ltd. Jan. 30. 3170.

MIXED FERTILISERS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 25. 2624.

VALUABLE LIQUID PRODUCTS from coals, etc., manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 25. 2625.

HYDROCARBONS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 27. 2847.

ALIPHATIC FLUORINE COMPOUNDS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 29. 2957.

ALKYL HALIDES, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 29. 2958.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. Jan. 31. (Germany, Feb. 1, '33.) 3278.

WASHING GASES.—Imperial Chemical Industries, Ltd. Jan. 25. 2618.

REGENERATING refuse sulphuric acid.—Metallges Akt.-Ges. Jan. 25. (Germany, March 15, '33.) 2622.

REGENERATING refuse sulphuric acid.—Metallges Akt.-Ges. Jan. 25. (Germany, Nov. 29, '33.) 2623.

Books Received

The Manufacture of Gas. Edited by H. Hollings. Vol. I. Water Gas, by R. H. Griffith. London: Ernest Benn, Ltd. Pp. 260. 36s.

Official Publications

Economic Situation in the Belgian Congo. By Harold C. Swan. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 84. 2s. 6d.

Economic Conditions in the Dominican Republic, by H. E. Slaymaker and in the Republic of Havti, by F. M. Shepherd. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 64. 2s. 3d.

Report of the Water Pollution Research Board for the year ended June 30, 1933. Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 50. 1s.

Economic Conditions in the Union of South Africa. By N. Elmslie. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 74. 2s.

New Chemical Trade Marks

Opposition to the registration of the following trade marks can be lodged up to February 24, 1934

Restryst. 546,061. Class 1. Chemical substances for use as additions to corrosive preparations for the purpose of restraining the action of such preparations. Ian Griffith Slater and Harold John Smith, trading in co-partnership, "Woodbank," Grindleford, Derbyshire. November 11, 1933.

Shadeacrete. 546,733. Class 1. Chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. W. Hawley and Son, Ltd., Colour Works, Duffield, Derbyshire. December 2, 1933.

From Week to Week

MR. LEONARD GOODBAN, F.I.C., of 43 Addison Gardens, London, W.14, died on February 2.

THE THIRD ANNUAL DINNER of the Scottish Dyes Foremen's Association was held at Grangemouth, last week, when a company of about 60 were present. Mr A. Primrose, president of the Association, was in the chair.

AFTER BEING CLOSED DOWN since 1926 the coke ovens and by-products works of the Blaenavon Co., Ltd., Blaenavon, Mon., are to restart operations. At least 120 former workers will be absorbed immediately.

BY AN UNFORTUNATE PRINTERS' ERROR, the advance of £2 10s. per ton in the price of glycerine, announced by Glycerine, Ltd., was recorded in THE CHEMICAL AGE last week as "an allowance." The increase in price took effect on February 1.

MRS. EMILY SMITH, of 32 North Lane, Teddington, Middlesex, widow of Richard Smith, of Liverpool, manufacturing chemist, left estate of the gross value of £53,277 with net personalty £52,064.

BAKER, PERKINS, LTD., of Peterborough, has intimated that as from January 1, 1934, the cuts in the salaries of the company's staff will be abolished, and in addition the cuts sustained in the previous twelve months will be returned. Approximately 600 out of 2,000 employees are affected.

COPES REGULATORS, LTD., Burleigh House, 5/11 Theobalds Road, London, W.C.1, have been appointed sole distributors in Great Britain and the Dominions for thermo-electric pyrometers, recorders, and heat control apparatus, as manufactured by Ether, Ltd., Birmingham.

MR. H. EUSTACE MITTON, a director of the Butterley Co., Ltd., has been presented with the Gold Medal of the Institution of Mining Engineers. Mr. Mitton prospected in the Yukon district in 1891, and was the youngest white man to penetrate as far as Forty Mile Creek.

WE REGRET TO ANNOUNCE THE DEATH on January 30 after a short illness, of Mr. Henry White, who was chairman of W. Pickard and Co., Ltd., from the time of its formation to the beginning of January, when he resigned owing to the condition of his health. The funeral was at All Saints' Church, Sheffield, on February 2.

APPLICATIONS FOR LICENCES under the Dyestuffs (Import Regulation) Act, 1920, during January totalled 1,044, of which 959 were from merchants or importers. To these should be added three cases outstanding on December 30, making a total of 1,047. The Dyestuffs Advisory Licensing Committee granted 1,029 licences and referred ten applications to British makers of similar products, leaving eight cases outstanding on January 31.

MR. J. M. AINSWORTH, A.I.S.A., has been appointed secretary of the Vacuum Oil Co. Mr. Ainsworth, who is a native of Yoxford, Suffolk, was educated at Alleyn's School, Dulwich, and joined the Vacuum Oil Co. in June, 1918. After filling a variety of posts in the company, he was posted to the secretarial and legal department, and has been assistant secretary since April, 1930. During the war Mr. Ainsworth served with the Honourable Artillery Company.

IN THE CHANCERY DIVISION on February 5, Mr. Justice Eve had before him a petition by Mr. Bernard Augustus Holland, of Mores Gardens, Chelsea, engineer, for the compulsory winding-up of the Darlington Rustless Steel and Iron Co., Ltd., and a petition by the company asking for the sanction of the Court to a scheme of arrangement. Mr. Lionel Cohen, K.C., appeared for Mr. Holland and Mr. Jenkins, K.C., for the company. His lordship eventually agreed to let both petitions stand over for one week.

RUTHS' INTERNATIONAL ACCUMULATORS, LTD., have made an arrangement with British Arca Regulators, Ltd., in regard both to technical co-operation and to the development of sales in Great Britain. British Arca Regulators, Ltd., is an associated company of Belliss and Morcom, who are widely known as makers of generators and steam turbines. The new company will be known as Ruths-Arca Accumulators, Ltd., under the chairmanship of Colonel Morcom, and will have its headquarters at Windsor House, Victoria Street, London, S.W.1.

THE L.N.E.R. ANNOUNCES A NEW FACILITY for passengers. Trained typists, fully equipped with an office, will be provided, so that letters may be dictated, correspondence dealt with, documents typewritten and communications posted en route. The service on which this innovation will be provided is the 8.15 a.m. express from Newcastle-on-Tyne to King's Cross, and the 5.30 p.m. express from King's Cross which reaches Newcastle at 10.37 p.m. A special dictating compartment will be set aside in addition to the business office, and reasonable charges for the services provided will be made.

THE INSTITUTION OF ELECTRICAL ENGINEERS has awarded the Faraday medal to Sir Frank E. Smith, secretary of the Department of Scientific and Industrial Research.

THE CAMBRIAN WAGON CO., LTD., announces that from February 5 its head office has been removed from East Moors Road to Maindy, Cardiff.

A VERDICT OF ACCIDENTAL DEATH was recorded at Workington on February 5, on Joseph Tunstall, of Derwent Crossings, who was asphyxiated by carbon monoxide fumes at the gas purifying plant at the Derwent Steelworks at Workington.

A BROADCAST DISCUSSION on "Oil or Coal—Britain's Fuel Problem" between Mr. W. R. Gordon, director of the Coal Utilisation Council, and Mr. Adrian Corbett, of the Royal Dutch-Shell Oil Group, took place from London on February 2.

THE NOMINAL CAPITAL of Kaycee, Ltd., producers and manufacturers of minerals, vegetable gums, chemicals, etc., Thanet House, 231 Strand, W.C., has been increased by the addition of £1,000 beyond the registered capital of £2,000. The additional capital is divided into 1,000 "B" ordinary shares of £1 each.

MR. FRED THOMPSON (47), of East Beach, Lytham, Lancs., formerly of Bury New Road, Prestwich, near Manchester, managing director of F. Thompson and Co., drysalters, chemical colour and rubber waterproof manufacturers, left £33,713 (net personalty £31,800).

WITHIN LESS THAN SIXTY MINUTES the laboratory and mixing department at the chemical works of Thomas Kerfoot and Co., Ltd., Bardsley, near Ashton, were destroyed by fire on February 1. Despite this misfortune the annual dinner of the firm and its employees took place as usual at Ashton Town Hall in the evening.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for the addition to the free list of alloys or mixtures of calcium and silicon or of calcium, silicon and iron, containing not less than 20 per cent. of calcium and not less than 60 per cent. of silicon. Any representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than March 5, 1934.

THE REPORT OF THE GAS LIGHT AND COKE CO. for 1933 shows that gas sales fell from £8,642,664 in 1932 to £8,419,295, while total revenue was reduced from £12,114,573 to £11,833,255. Expenses, charges, etc., totalled £9,855,490, against £10,079,892, and net revenue is down nearly £57,000—from £2,034,681 to £1,977,765. After interest and interim payments the available balance of £882,768 compares with £913,768, and, as already announced, the total distribution on the ordinary stock is maintained at £5 12s. per cent.

A CONTROLLING INTEREST in the G.C. Engineering Co., Ltd., has been acquired by Fredk. Braby and Co., Ltd., metal workers and structural engineers, 352-364 Euston Road, London, N.W.1, and Ida Works, Grinstead Road, Deptford, S.E.8. The G.C. Engineering Co., Ltd., are manufacturers and designers of conveyors, and complete canning lines. Mr. R. F. Graham and Mr. S. C. Calladine are being retained on the board. Can elevating and conveying machinery will be shown in motion on Braby's Stand (No. D.411) at the British Industries Fair (Birmingham Section).

THE USE OF TRICHLORETHYLENE for the degreasing of metals or machinery is extending with great rapidity, and proof of the great strides made in methods will be found in the stand organised by I.C.I. (General Chemicals) Ltd., at the British Industries Fair at Castle Bromwich, where a great extension of the range of models will be shown. One novelty is a vapour plant for degreasing the inside of compressed gas cylinders. In this the cylinder to be cleaned is inverted over a pipe conveying trichlorethylene vapour generated in a suitably heated still. When degreasing is complete the mixture of solvent and oil drops back through an annular space round the vapour nozzle and returns via a condenser to the still.

IN THE CHANCERY DIVISION on February 5, a scheme for the reduction of the capital of the United Molasses Co., Ltd., from £8,000,000 to £3,515,832 was sanctioned by Mr. Justice Eve. There was no opposition. Mr. Gordon Brown (for the company) said that the present capital of the company consisted of 3,000,000 preference shares and 5,000,000 ordinary shares of £1. Under the scheme the reduced capital would be divided into 2,500,000 preference shares of 10s.; 500,000 of £1 of no specified class: and 5,297,498 ordinary shares of 6s. 8d. The holders of the 2,500,000 preference shares would receive £1,250,000 6 per cent. cumulative unsecured income debenture stock. The sum of 13s. 4d. would be written off each of the 4,851,251 ordinary shares at £1. There was no opposition to the proposed scheme.

Forthcoming Events

Feb. 12.—Ceramic Society. "Alkaline Casting Slip." Dr. Harry W. Webb. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Feb. 12.—Institution of the Rubber Industry (London Section). "Conveyor Belting." R. Huxley. 7.30 p.m. First Avenue Hotel, High Holborn, London.

Feb. 12.—Institute of Metals (Scottish Section). "Fuel." J. A. C. Edmiston. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Feb. 13.—Institute of Chemistry (Huddersfield Section). "The Industrial Application of X-Ray Analysis." Dr. W. T. Astbury.

Feb. 13.—Midland Metallurgical Societies. "Age Hardening Copper Alloys." M. Cook. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

Feb. 13.—Institution of Petroleum Technologists. "The Chemical Evidence for the Low-Temperature History of Petroleum," by B. T. Brooks; read by Dr. A. E. Dunstan. 5.30 p.m. House of the Royal Society of Arts, John Street, Adelphi, London.

Feb. 13.—Institute of Metals (N.E. Coast Section). "The Flow of Metals in the Extrusion Process." C. E. Pearson. 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Feb. 13.—Institute of Metals (Swansea Section). "Cracking and Fracture of Metals with Special Reference to Service Breakages." Professor F. Bacon. 6.15 p.m. Y.M.C.A., Swansea.

Feb. 14.—Society of Dyers and Colourists (Midlands Section). "Textiles Purchased by British Railways and their Application." W. Pritchard. Joint Meeting with the Textile Institute, Derby.

Feb. 14.—Society of Chemical Industry. Joint meeting of Plastics Group and Road and Building Materials Group. "An Ostwald Viscometer for Tar." Dr. A. R. Lee. "The Measurement of the Properties of Plastic Road Surfaces." B. G. Manton and W. G. Wren. 7.30 p.m. Burlington House, Piccadilly, London.

Feb. 15.—Society of Dyers and Colourists (West Riding Section). "Recent Developments in Coal Carbonisation." H. P. Hird.

Feb. 15.—Institute of Fuel. Joint meeting with the Institution of Electrical Engineers, the Institution of Mechanical Engineers, and the Institute of Marine Engineers. "Recent Developments of the Benson Boiler." Dr. Ohlmuller. Lecture Theatre of the Institution of Electrical Engineers, London.

Feb. 15.—Society of Chemical Industry and Institute of Chemistry (Edinburgh Sections). "Some Fundamental Scientific Problems in the Food Industry." Dr. L. H. Lampitt. 8 p.m. North British Station Hotel, Edinburgh.

Feb. 15.—Institute of Chemistry (Edinburgh Section). Annual general meeting. 7.30 p.m. North British Station Hotel, Edinburgh.

Feb. 15.—The Chemical Society. Discussion on "Some Aspects of the Electronic Theory of Valency," opened by Professor J. E. Lennard-Jones. 8 p.m. Burlington House, London.

Feb. 15.—Institute of Chemistry (Belfast Section). "Some Aspects of Modern Astronomy." J. C. A. Brierley. 7.45 p.m. Royal Belfast Academical Institution, Belfast.

Feb. 16.—Society of Dyers and Colourists (Manchester Section). "The Naphthol Group of Colours." A. F. Williams. 7 p.m. 36 George Street, Manchester.

Feb. 16.—Institution of Chemical Engineers. Twelfth annual corporate meeting and annual dinner.

Feb. 16.—Institute of the Plastics Industry (Midlands Section). "Efficiency in the Moulding Shop." W. J. Inshaw. 7.30 p.m. Imperial Hotel, Temple Street, Birmingham.

Feb. 16.—Institution of the Rubber Industry (Manchester Section). Joint meeting with the Society of Chemical Industry. "Solvents." H. G. Shadwell. Engineers' Club, Manchester.

Company News

Redfern's Rubber Works, Ltd.—The report of the directors for the year to December 31 last states that the revenue amounted to £15,666, from which must be deducted depreciation £7,381, leaving a net profit of £8,285, which with the balance brought forward from December 31, 1932, makes a total of £21,934. After deducting dividends on "A" and "B" preference shares for the half-years ending December 31, 1932 and June 30, 1933, and the final dividend on the ordinary shares for the year ending December 31, 1932, there is a balance available for appropriation of £9,934. The directors recommend the payment of the final dividends on "A" and "B" preference shares, a dividend of 2½ per cent. on the ordinary shares, leaving, to be carried forward, £3,434. The annual meeting will be held on February 15, at Dawson Street, Hyde, at 12 noon.

Chemical Trade Inquiries

The following trade openings are extracted from the current issue of the "Journal of the Italian Chamber of Commerce in London." Particulars may be obtained on application to the Secretary, Italian Chamber of Commerce, 10 Queen Street, London, E.C.4.

Olive Oil.—A London agent is required by an important Italian firm of olive oil producers and exporters. (Ref. 88.)

Dry Colours.—Selling agents are required by Italian manufacturers of dry colours (oxides, sienna and umber earths, etc.). (Ref. 7393.)

Industrial Olive Oil.—An Italian exporter offers industrial olive oil suitable for the textile industry. (Ref. 7455.)

Gums.—A commission house in Turin wishes to represent London firm handling gum arabic. (Ref. 134.)

Palm Oil.—A selling agency is required for Palermo and Messina by representative in Palermo. (Ref. 7394.)

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—An Indian firm of indenting agents in Bombay is desirous of securing the representation of United Kingdom manufacturers of chemicals for textile and dyeing industries, sizing materials, pharmaceutical chemicals and drugs, on a commission basis, for Bombay Presidency, the Punjab and Central India. (Ref. No. 141.)

British India.—A Parsee firm of indenting agents in Bombay is desirous of securing the representation of United Kingdom firms for paints, varnish, enamels, etc, on a commission basis, for Bombay Presidency. (Ref. No. 142.)

British India.—H.M. Senior Trade Commissioner in India reports that the Indian Stores Department is calling for tenders, to be presented in New Delhi by March 31, 1934, for the supply of fire extinguishers for the period June 1, 1934, to May 31, 1935. (Ref. G.Y. 13409.)

Finland.—A firm in Helsingfors wishes to represent United Kingdom manufacturers of dry paints and bone-flour. (Ref. No. 163.)

Argentina.—The Commercial Counsellor to H.M. Embassy at Buenos Aires reports by telegraph that the Argentine Sanitary Works Department is calling for tenders for the supply of 12,000 metric tons of Portland cement (approved brands). Tenders must reach Obras Sanitarias de la Nacion, Direccion General, Calle Charcas 1840, Buenos Aires, not later than February 26, 1934. (Ref. B. 7746.)

Argentina.—The Commercial Secretary to H.M. Embassy at Buenos Aires reports that the Argentine State Oilfields Directorate is calling for tenders, to be presented in Argentina by March 2, 1934, for the supply of 1,759,500 kilogs. of quick-setting Portland cement; 1,202,000 kilogs. of ordinary Portland cement; and 600 kilogs. of white cement. (Ref. B.Y. 7747.)

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